A		Reg. No. :								
Question Paper Code: 54021										
	B.E./B.Tech. DEGREE EXAMINATION, APRIL 2019									
		Fourth	n Semester							
	Computer Science and Engineering									
	15	UMA421 - DISCI	RETE MAT	HEMATI	CS					
		(Common to Info	ormation Tec	chnology)						
(Regulation 2015)										
Dur	Duration: Three hours Maximum: 100 Marks Answer ALL Questions									
PART A - $(10 \text{ x } 1 = 10 \text{ Marks})$										
1.	The symbolic form of "If it is raining, then I get wet" is CO1- R									
	(a) $P \rightarrow Q$	(b) $\neg Q \rightarrow \neg P$	(c) ¬.	(c) $\neg P \rightarrow Q$ (d) $P \rightarrow (P$						
2.	Given $P = \{2,3,4,5,6\},\$	state the trut	h value o	of the	stateme	ent	CO1-	R		
	$\left(\exists x \in P\right)\left(x + 3 = 10\right)$									
	(a) True	(b) Fa	(b) False							
	(c) Neither true nor fals	(d) N	(d) None of the above							
3.	What is the number of arrangement of all the six letters in the word CO2- PEPPER?									
	(a) 50	(b) 6	(c) 60)		(d) 600				
4.	What is the solution of the recurrence relation $a_n = a_{n-1} + 2a_{n-2}$? CO2-							R		
	(a) $C_1(-1)^n + C_2(-2)^n$	(b) $C_1(2)^n + C_2(-$	$(c) C_{1}$	$(-2)^{n} + C$	2	(d) $C_1(2)$	$D^{n} + C_{2} \left(-1\right)^{n}$			
5.	If the degree of any ver	f the degree of any vertex of a graph is one, then the vertex is called CO3-1								
	(a) Pendent	(b) Pseudo	(c) M	ultiple		(d) Cyc	lic			
6.		raph is called if there is a path between every pair of CO3- R nct vertices of the graph.								
	(a) Disconnected	(b) Connected	(c) Eu	uler		(d) Han	niltonian			

7.	Let S be a non empty set and $*$ be a binary operation on S. The algebraic system (S, $*$) is called aif the operation $*$ is associative.									
	(a) Gr	oup	(b) Semigroup	(c) Monoid	(d) Abelian					
8.	A sub aH=H		(G,*) is called a	if for any $a \in G$,		CO4- R				
	(a) Gr	oup (b)	Normal subgroup	(c) Abelian group	(d) Cyclic group					
9.	The co	omplemented, dis	stributive lattice is a		CO5- R					
	(a) Bo	olean algebra	(b) Distributive	(c) Lattice	(d) Sub latti	ce				
10.	$a \bullet b +$	$a \bullet b' =$				CO5- R				
	(a) a		(b) b	(c) <i>a</i> '	(d) <i>b'</i>					
			PART – B (5 x 2	2= 10 Marks)						
11.										
12.										
13.										
14.	Show that every cyclic group is abelian. CO4- R									
15.										
				x 16= 80 Marks)						
16.	(a)	(i) Obtain the P	CO1- An							
		(ii) Show that <i>P</i> premises $P \lor O$	CO1- An	a (8)						
	premises $P \lor Q, Q \to R, P \to M, \neg M$ Or									
	(b)	(i) Show that	CO1- An	a (8)						
	(c) (f) Show that $(x)(P(x) \to Q(x)) \land (x)(Q(x) \to R(x)) \Rightarrow (x)(P(x) \to R(x))$									
	(ii) Show that $(\neg P \land (\neg Q \land R)) \lor (Q \land R) \lor (P \land R) \Leftrightarrow R$ without using truth table.					a (8)				

17. (a) (i) Find the number of integers between 1 and 500 that are not CO2- App (8) divisible by any of the integers 2, 3, 5 & 7.

(ii) Using Mathematical induction show that $\sum_{r=0}^{n} 3^{r} = \frac{3^{n+1} - 1}{2}$ CO2- App (8)

Or

(b) (i) Show that the recurrence relation $a_n - 7a_{n-1} + 6a_{n-2} = 0$ for CO2- App (8) $n \ge 2$ with initial conditions $a_0 = 8$ and $a_1 = 6$, using generating function.

(ii) There are six men and five women in a room. Find the CO2- App (8) number of ways four persons can be drawn from the room if(a) they can be male or female,

- (b) two must be men and two women,
- (c) they all are of the same sex.
- 18. (a) (i) Prove that in a simple graph with n vertices and k CO3-Ana (8) components cannot have more than $\frac{(n-k)(n-k+1)}{2}$ edges.

(ii) Prove that a connected graph G is an euler graph if and only CO3- Ana (8) if all vertices of G are of even degree.

Or

(b) (i) Define isomorphism between two graphs. Are the simple CO3- Ana (10) graphs with the following adjacency matrices isomorphic?

0	1	0	0	0	1]	∏ 0	1	0	0	0	1]
1	0	1	0	1	0	1	0	1	0	0	1
0	1	0	1	0	1	0	1	0	1	1	0
0	0	1	0	1	0	0	0	1	0	1	0
0	1	0	1	0	1	0	0	1	1	0	1
1	0	1	0	1	0	1	1	0	0	1	0

(ii) State and prove handshaking theorem. CO3- Ana (6)

19. (a) (i) Show that $(Q^+,*)$ is an abelian group where * is defined by CO4- Ana (8) $a*b = \frac{ab}{2}, \forall a, b \in Q^+$

(ii) Prove that the kernel of a homomorphism is a normal CO4- Ana (8) subgroup of G.

- (b) (i) Prove that the intersection of two normal subgroups of a CO4- Ana (8) group G is again a normal subgroup of G.
 (ii) Let G be a finite group and H be a subgroup of G. Then CO4- Ana (8) prove that the order of H divides order of G.
- 20. (a) (i) Let $D_{30} = \{1, 2, 3, 5, 6, 10, 15, 30\}$ and let the relation R be divisor CO5- App (8) on D_{30} . Find (a) all the lower bounds of 10 and 15. (b) the glb of 10 and 15. (c) all upper bounds of 10 and 15. (d) the lub of 10 and 15. (e) draw the Hasse diagram. (ii) Prove that in a Boolean algebra $(a \lor b)' = a' \land b'$ CO5- App (8) Or (i) Show that every chain is a distributive lattice. (b) CO5- App (8)
 - (ii) Show that every chain is a modular. CO5- App (8)