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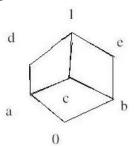
GUJARAT TECHNOLOGICAL UNIVERSITY MCA - SEMESTER- I• EXAMINATION – SUMMER 2016

Date: 09-05-2016

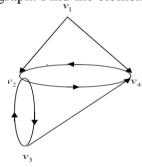
Subject Code: 610003

	Time	cet Name: Discrete Mathematics for Computer Science 2 02.30 pm To 05.00 pm 3 Total Marks: 70 3 Inctions: 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks.	
Q.1	(a)	 i) Consider the statement, "If today is Monday, then I will go for a walk". Write converse, inverse and contrapositive for the given statement. ii) Test whether the given arguments are logically valid or not. "If it rains, the prices of vegetables go up. The prices of vegetables go up. So it rains." 	04
	(b)	 1.Let A= {1, 2, 3} then show that the inclusion relation ⊆ on A is a partial ordering. 2. Define Direct Product and draw the Hasse diagrams of <s,d>, <l,d> and <s d="" l,="" x=""> for S = {1,3,6} and L = {1,2,4}.</s></l,d></s,d> 3. State the Lagrange's theorem. 	03 03 01
Q.2	(a)	Draw hasse diagram for the following. (i) (S60, <i>D</i>) (ii) (S100, D). Here <i>S n</i> is the set of divisors of n.	07
	(b)	Using indirect proof technique, show that if a^2+3 is odd, then a is even. Where a is an integer.	07
	(b)	Show that $<$ S30,*, \oplus $>$ and $<$ P(A), \cap ,U> are isomorphic lattices for A = {a,b,c}.	07
Q.3	(a)	 Consider lattice < S10, *, ⊕ >, where S10 = {1,2,5,10}. Find the complements of the elements of S10. Write the following Boolean expression in an equivalence sum-of products canonical form in three variables x1,x2 and x3. x1 * x2. x1 ⊕ x2. 	02 02 03
	(b)	 Show that (Using laws) the following Boolean expressions are equivalent. (i) [a*(b'⊕c)]'*[b'⊕(a*c')']' = a*b*c' (ii) (x⊕y)*(x'⊕y) = y By constructing the truth table that prove that p Λ (~q→~p) → q is a tautology 	02 02 03
Q.3	(a)	OR Define: Sub-Lattice. Show that S ₆ is sub lattice of lattice <s<sub>30, D>.</s<sub>	07

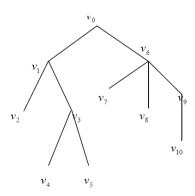
(b) Define: Join-irreducible, Meet-irreducible, Atoms and Anti-Atom. Determine the join-irreducible, meet-irreducible, atoms and anti-atoms for given lattice.



- Q.4 (a) Use the Quine McClusky method to simplify the SOP expansion, $F(a,b,c,d) = \Sigma$ (0, 2, 4, 6, 8, 10, 12, 14) and draw the circuit diagram of the minimized function.
 - (b) Prove that <Z11*, *11> forms a group with respect to multiplication modulo 11. 07
- Q.4 (a) Prove that the relation "Congruence modulo n" given by $\{\langle x,y \rangle \mid x \text{-} y \text{ is divisible by } 07 \text{ n} \}$ is an equivalence relation.
 - (b) i)Show that $(Z_6, +_6)$ is a cyclic group of order 6 and also find its generators. 05 ii) In any Boolean algebra, show that $a \le b \Rightarrow a \oplus (b * c) = b * (a \oplus c)$
- Q.5 (a) i) Define Multigraph.
 ii) Define adjacency matrix of a digraph. Obtain the adjacency matrix A of the given digraph. Find the elementary paths of lengths 1 and 2 from v₁ to v₄.



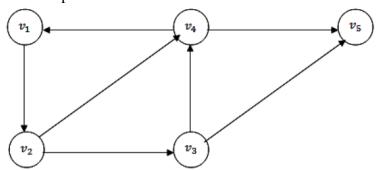
(b) Define directed tree. Draw different representation of the following tree. 01



OR

07

Q5. (a) Find the strong components of the following diagraph. Also find its unilateral and weak components.



(b) Define Sub group. Find the subgroups of $(Z_{10}, +_{10})$