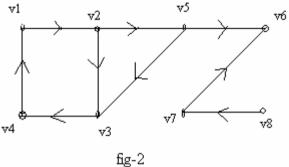
GUJARAT TECHNOLOGICAL UNIVERSITY MCA Integrated – SEMESTER – II • EXAMINATION – SUMMER - 2016

Subject Code: 4420601Date: 25-05-2016Subject Name: Discrete Mathematics for Computer ScienceTime: 10.30 am To 01.00 pmInstructions:1. Attempt all questions.			
		Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	
Q.1	(a)	Prove the following Distributive inequalities: (1) $a \oplus (b * c) \le (a \oplus b) * (a \oplus c)$ (2) $a * (b \oplus c) \le (a * b) \oplus (a * c)$	07
	(b)	Prove that $S_6 = \{1,2,3,6\}$ is a sub lattice of $\langle S_{30}, D \rangle$.	07
Q.2	(a)	Define Sub Boolean Algebra. State the necessary and sufficient condition for a subset becomes sub-boolean algebra. Find all sub Boolean algebra of $\langle S_{110}, D \rangle$.	07
	(b)	Explain all properties of Boolean algebra.	07
	(b)	OR Show that set of fourth root of unity $\{1,-1,i,-i\}$ forms the group with respect to the multiplication where i denotes the complex number and $i^2 = -1$.	07
Q.3	(a)	Write the following Boolean expression in Sum-Of-Product Canonical form in four variables X_1, X_2, X_3, X_4 . $X_1 \oplus X_2$	07
	(b)	Find the minimal SOP form using Quine – McCluskey method. $F(a,b,c,d) = \sum 0,1,2,5,6,7,8,9,10,14.$	07
Q.3	(a)	OR Define K-map. Use the K-map representation to find SOP expression of $f(x,y,z,w) = \sum (0,1,2,3,13,15)$	07
	(b)	Prove that the set $G = \{0,1,2,3,4\}$ is a finite abelian froup of order 5 with respect to addition modulo 5.	07
Q.4	(a)	Show that $\langle Z_8 \rangle$, $+_8 \rangle$ is a cyclic group of order and also find its generator.	07
	(b)	Let $4Z = \{\pm 4, \pm 8, \pm 12, \ldots\}$ Construct $\frac{Z}{4Z}$ and construct composition table. OR	07
Q.4	(a)		04 03

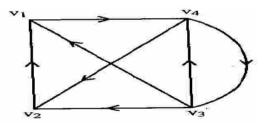
- (b) Find in-degree and out-degree of each node from the following adjacency 07 matrix A and also draw its diagraph.
 - $\mathbf{A} = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
- **Q.5** (a) Give three other representations of tree expressed by $(V_0(V_1(V_2) (V_3) (V_4))(V_5(V_6) (V_7) (V_8) (V_9))(V_{10}(V_{11}) (V_{12})))$
 - (b) Show through two examples with $n_t = 7$ and $n_t = 8$ of complete binary tree that **07** the total number of edges is given by $2(n_t 1)$, where n_t is the number of terminal nodes.

OR

Q.5 (a) Define node base of a diagraph. Find all node base of the diagraph in the 07 following graph. List all the properties of a node base.



(b) Define adjacency matrix of a graph and obtain the adjacency matrix (A) for the following graph. State the in degree and out degree of all the vertices. Find A², A³ and Path matrix P.



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