

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER-I • EXAMINATION – SUMMER 2013

Subject Code: 2610003

Date: 11-06-2013

Subject Name: Discrete Mathematics for Computer Science (DMCS)

Time: 10:30am to 13:00pm

Total Marks: 70

Instructions:

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. **04**
 - ii) Test whether the given arguments are logically valid or not. **03**
“If it rains, the prices of vegetables go up. The prices of vegetables go up. So it rains.”
- (b)** Using indirect proof technique, show that if a^2+3 is odd, then a is even. **07**

Q.2 (a) Determine join-irreducible elements, meet-irreducible elements, atoms and antiatoms for the lattices shown in the Figure – 1. **07**

(b) Find all subalgebra of Boolean algebra $\langle S_{30}, \wedge, \vee, ', 0, 1 \rangle$. **07**

OR

(b) Find the prime implicants and minimal sum of products for the following: **07**

- i) $\alpha(x,y,z) = xyz + xyz' + x'yz' + xy'z$
- ii) $\beta(x,y,z) = x'y'z + x'yz + xy'z + xyz' + xyz$

Q.3 (a) Let Z be set of all integers and R be relation on Z defined by for $a, b \in Z$, aRb , if $b = a^r$ for some integer r , then $\langle Z, R \rangle$ is a poset. **07**

(b) State and prove absorption law for lattice $\langle L, \leq \rangle$. **07**

OR

Q.3 (a) Draw Hasse Diagram for poset: $\langle S_{60}, D \rangle$; where aDb means a divides b . Write cover of each elements of S_{60} **07**

(b) Let $A = \{a, b\}$ then show that $\langle P(A), \supseteq \rangle$ is a lattice. **07**

Q.4 (a) Show that the set of cube roots of unity forms a group under multiplication. **07**

(b) Let $(R, +)$ and $(R^+, \cdot)$ be two groups with addition and multiplication respectively. Prove that the function $f: R \rightarrow R^+$ defined by $f(a) = e^a$; for all $x \in R$ is an isomorphism from **07**

R onto R^+ .

OR

Q.4 (a) Show that the set of all positive rational number forms an abelian group under the composition defined by $a * b = ab/2$. 07

Q.4 (b) Define: Cyclic Group. Find the generator of (Z_5^*, X_5) . 07

Q.5 (a) Find in-degree and out-degree of each node from the following adjacency matrix A and draw its diagram. 07

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$$

(b) Convert given forest into binary tree. 07
Refer Figure – 2

OR

Q.5 (a) Define with an example: Edge Simple and Node Simple. Verify that, are the following graphs are isomorphic? 07
Refer Figure – 3

(b) Give all the leaf and branch nodes. 07
Give all the sub-tree with roots which are nodes at level 1.
Refer Figure – 4

Figure – 1

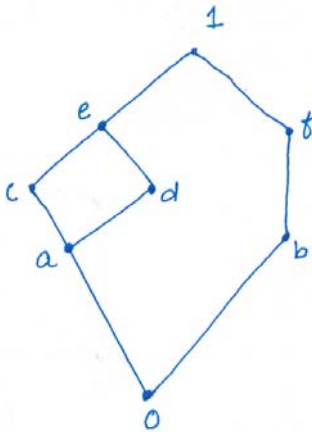


Figure – 2

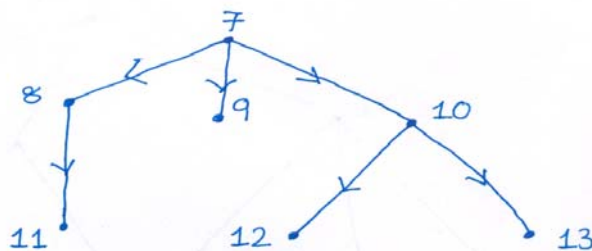
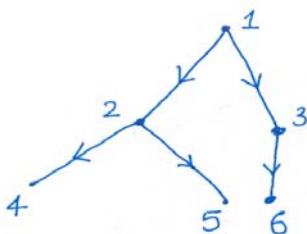


Figure – 3

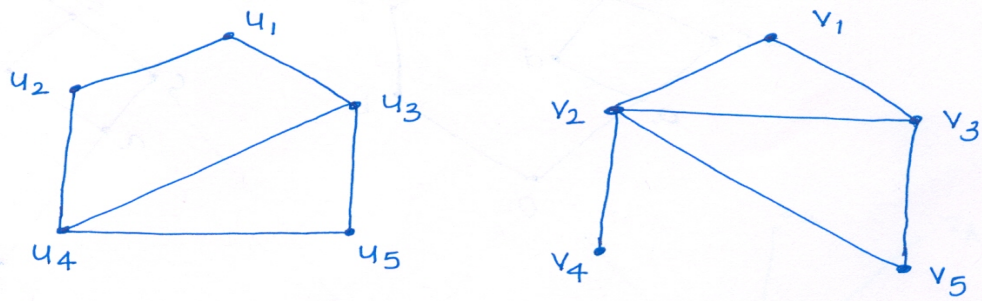


Figure – 4

