No. of Printed Pages : 5

CS-07

02044

ADCA / MCA (II Yr.)

Term-End Examination

December, 2010

CS-07 : DISCRETE MATHEMATICS

Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is compulsory. Attempt any three from the rest.*

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1. (a) Construct the truth table for $\neg(P \wedge \theta) \leftrightarrow (\neg P \vee \neg\theta)$. 3

   (b) Check whether the following, DeMorgan's law involving $\uparrow$ and $\downarrow$. 4

   $\neg(P \uparrow \theta) \equiv \neg P \downarrow \neg\theta$ is true or not, where $P \uparrow \theta \equiv \neg(P \wedge \theta)$ and $P \downarrow \theta \equiv \neg(P \vee \theta)$.

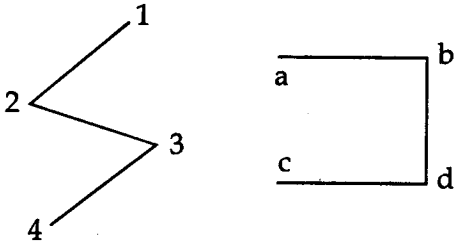
   (c) Let there be a graph G, with adjacency matrix given as follows : 5

$$A(G) = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

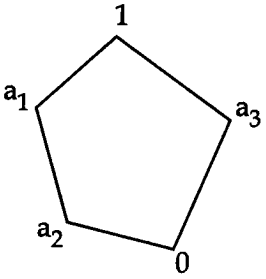
   Check if G is connected.

(d) When two graphs are said to be isomorphic ? 3

Show that the two graphs are isomorphic.



(e) Show that the pentagonal lattice 4



is not modular.

(f) Express the number − 11 in 1s and 2s complement forms. 3

(g) Let A = {1, 2, 3, 4} and 4

R = { (1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 3), (1, 3), (4, 1), (4, 4)}

Is R an equivalence relation on A.

(h) Write truth table for full adder and draw the circuit diagram of full adder using two half adder. 4

2. (a) Obtain Principal Conjunctive Normal Form (PCNF) for 4

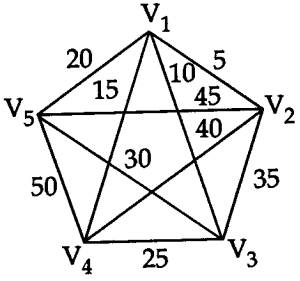
$$(\neg p \rightarrow r) \wedge (q \leftrightarrow p)$$

(b) Write the inverse, converse, contrapositive for $[p \wedge (p \rightarrow q)] \rightarrow q$ 4

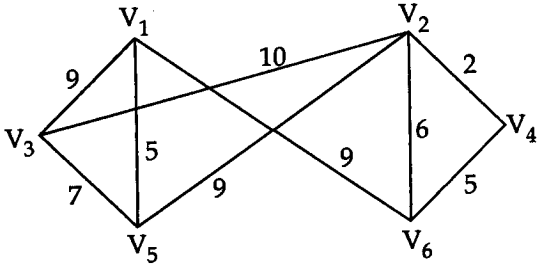
(c) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology. 3

(d) Find the validity of conclusion from given set of premises $\{ P \leftrightarrow Q$, $R \vee \neg S$, $Q \rightarrow S$, $\neg P \rightarrow R \}$ and $C : R$ without truth table, ($\neg$ stands for NOT) 4

3. (a) Solve the following graph using Closest Insertion Method. 6



(b) Find minimum spanning tree using Kruskal's algorithm for the graph given below. 6



(c) Define the concepts of Hamiltonian graph and an Eulerian graph. Give an example of graph that is Hamiltonian but not Eulerian. 3

4. (a) A survey among 1000 people, 595 are democrats, 595 wear glasses, 550 like ice-cream, 395 of them are democrats who wear glasses, 350 of them are democrats who like ice-cream. 400 of them wear glasses and like ice-cream and 250 all the three. 6

(i) How many of them are not Democrats, do not wear glasses and do not like ice-cream ?

(ii) How many of them are democrats who do not wear glasses and do not like ice-cream ?

(b) Let Z denote the set of integers and the Relation R on Z be defined by "aRb", iff a-b is an even integer. Then show that R is an equivalence relation. 4

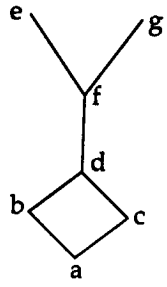
(c) Define each of the following with an example. 5

(i) Fuzzy Set

(ii) Union of two Fuzzy Set

(iii) Intersection of two Fuzzy Set.

5. (a) Find for each whether it is lattice or not ? If not, why ? 3



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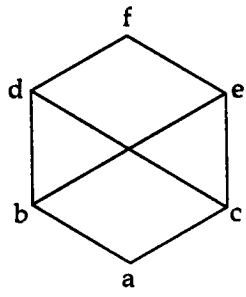

II

(b) Every Chain is a distributive lattice. Prove it. 3

(c) Use k-map to simplify the following 4

$A^1B^1CD + A^1B^1CD^1 + AB^1C^1D^1 + AB^1CD^1$

(d) Draw the logic network diagram for the expression $AB + CD$. 3

(e) Draw Harse diagram for the partial ordering $\{ (A, B) \mid A \subseteq B \}$ on the power set $P(S)$ where $S = \{a, b, c\}$. 2