# ADCA / MCA (II Yr.) 

Term-End Examination

December, 2011

## CS-07 : DISCRETE MATHEMATICS

Time : 3 hours
Maximum Marks : 75
Note : Question No. 1 is compulsory. Attempt any three from the rest.

1. (a) Express PVQ using $\uparrow$ only. 3
(b) Write the output of following gating 4 network.

(c) Define the following terms with suitable example. $2+2=4$
(i) cut set (minimum)
(ii) Tree
(d) What conditions should a graph satisfy to have a Euler circuit? Explain.
(e) Let $\mathrm{f}(x)=x^{2}$ and $\mathrm{g}(x)=2 x$. Find fog $(x)$ and 2 $\operatorname{gof}(x)$
(f) Let $A=\{1,2,3,4,5\}$ Let $R$ be a relation on $A \quad 4$
such that $a R b$ iff $a+b<8$. Find $R$ and check
if it is
(i) refelexive (ii) symmetric (iii) transitive
(g) Let $f=\left(\begin{array}{llll}1 & 2 & 3 & 4 \\ 4 & 2 & 1 & 3\end{array}\right)$ and $g=\left(\begin{array}{llll}1 & 2 & 3 & 4 \\ 2 & 4 & 3 & 1\end{array}\right) \quad 2$ find fg and gf.
(h) Make the truth table for full binary 3
substractor.
(i) Show that $(\mathrm{D}(30), \mathrm{gcd}, \mathrm{lcm})$ is uniquely 3

2. (a) Express $\vee, \wedge \leftrightarrow$ using $(7, \rightarrow)$ only 3
(b) Obtain the principal disjunctive normal 5 $(P \rightarrow(P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$
(c) Write the following sentences using predicate logic.
(i) Every gold ornament glitters. 1
(ii) There is something which glitters but 2 is not gold ornament.
(iii) Once dead one is dead for all time to 2
come.
(d) Explain modus tollens. 2
3. (a) Explain the concept of isomorphic graphs 3 with the help of suitable example.
(b) Write adjacency matrix for following graph 4 and check whether it is connected.

(c) Use Prim's algorithm to find minimal spanning tree of following graph.

(d) Explain closure of a graph with suitable example.
4. (a) Define fuzzy sets to express the human age 6 concepts (child, young, middle-aged, old, very old).
(b) Define the concept of hashing function and explain its utility in computer science..
(c) Explain how will you identify 2
(i) reflexive relation
(ii) symmetric by visualising the relation matrix.
(d) Make Venn diagram for $\mathrm{A}-\mathrm{B}$
(i) When BCA
1
(ii) $A \cap B \neq \phi$ 1
5. (a) What is a partial order relation? Define 5 Poset. Show that $(I, \geq)$ is a poset. (Where I is a set of integer and $\geq$ is normal comparision operator between integers e.g. $8 \geq 6$ ).
(b) For the following switching cirucuit write the boolean expression.

(c) Compute $91_{10}-47_{10}$ using 2's complement 3 arithmetic.
(d) Design a finite state machine to accept the 3 language $(a b+b a) c$ over the alphabet $\Sigma=\{a, b, c\}$
