

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
II.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOVEMBER, 2009
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT, CSS)

Time: 3hours

Max.Marks:80

Answer any FIVE questions
All questions carry equal marks

1. a) Express the formula $P \rightarrow Q$ in terms of $\{\uparrow\}$ only
 b) Show the following equivalence :

$$(A \wedge (\sim A \vee B)) \vee (B \wedge \sim (A \wedge B)) \Leftrightarrow B$$

 c) Which of the following formula is not a tautology
 i) $(P \rightarrow Q) \rightarrow (Q \rightarrow R)$ ii) $(P \rightarrow Q) \wedge (Q \rightarrow P)$ [4+6+6]

2. a) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)p(x) \vee (\exists x)Q(x)$
 b) Using proof by contradiction, show that following premises are inconsistent:
 $A \rightarrow (B \vee C), B \rightarrow \sim A, D \rightarrow \sim C, A \Rightarrow A \rightarrow \sim D$ [8+8]

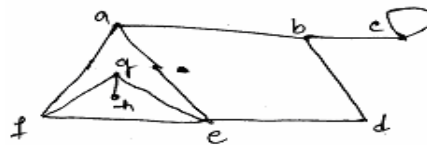
3. a) Find the inverse of following functions.
 i) $f(x) = x^4 + 1$ ii) $f(x) = \frac{10}{\sqrt[5]{7-3x}}$
 b) What do you mean by primitive recursive function ? [8+8]
 Prove that $f(x,y) = x * y$ is a primitive recursive function.

4. a) Consider the algebraic system: $(Z, *)$, where $*$ is defined by $a*b = a+b-ab$. State whether $(Z, *)$ is a group or Monoid. [16]

5. A binary composition $*$ in R is defined by $a*b = ab^2$ for all $a, b \in R$. Determine whether $*$ is associative or not. [16]

6. Show following recurrence relation :
 i) $a_n - 5a_{n-1} + 8a_{n-2} - 4a_{n-3} = n2^n$ ii) $a_n + 6a_{n-1} + 12a_{n-2} + 8a_{n-3} = 3^n$ [8+8]

7. a) What is spanning tree? What is minimum cost spanning tree? What are the different algorithms to compute minimum cost spanning tree? Explain with suitable, examples.
 b) Draw dual of following graph. [10+6]



8. a) What is chromatic number? What is chromatic number of a :
 i) Tree ii) C_n iii) $K_{m,n}$ iv) W_n
 b) Show whether following graphs are isomorphic or not: [8+8]

