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
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1. a) Obtain principle Conjunctive Normal Form of following formula:
   i) $(P \Leftrightarrow Q) \rightarrow R$
   ii) $(P \rightarrow Q) \Leftrightarrow (Q \rightarrow 7R)$
   b) Obtain the truth table for following formula.
   $(P \uparrow Q \uparrow R)$ [8+8]

2. a) Symbolize following statements:
   i) All cats are black   ii) Some apples are green   iii) A is father of mother of Y   [6+10]
   b) Show the validity of following arguments:
   i) $\sim R \rightarrow (S \rightarrow \sim T), \sim RVW, \sim P \rightarrow S, \sim W / -T \rightarrow P$
   ii) $P \rightarrow Q, Q \rightarrow R, / - P \rightarrow R$ [8+8]

3. a) Let $A = \{1, 2,3,4,\}$ & $A = \{ s \times s\}$. R is a relational set on A such that :
   (a, b) R (a^1, b^1) $\Leftrightarrow a + b = a' + b'$. Show that R is equivalence relation.
   b) Compute the power set of: $P(S), P(P(S))$ & $P(P(P(S)))$ where the set S = $\{\phi\}$

4. Explain following terms:
   i) Group   ii) Monoid   iii) Semi group   iv) Isomorphism   [16]

5. a) State & Prove principle of inclusion & exclusion of three variables.
   b) How many 10 digit numbers are there which contain only the digit 1,2 & 3 with the digit 2
   appearing in each number twice.   [8+8]

6. a) What is the recurrence relation for towers of Hanoi problem? Obtain a solution for it.
   b) Show that $(1 - 4x)^{-1/2}$ generates the sequence $c(2n, n), n \in N$ [8+8]

7. a) Describe various methods to generate spanning trees.
   b) Is there any simple graph with following degree sequence
   i) $(1,1,3,3,3,5,5,6)$ ii) $(1,2,2,3,4,7)$ [8+8]

8. a) Explain following
   i) Complete graph   ii) Spanning sub graph
   iii) Bipartite graph   iv) Euler graph
   b) let C_n be the cycle graph with n vertices. Prove that C_5 is the only cycle graph isomorphic to
   its complement.   [8+8]

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