

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) What do you mean by functionally complete sets? List out some functionally complete sets.
 b) Show that the following formulas are tautologies.
 i) $((P \rightarrow Q) \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$
 ii) $(P \rightarrow Q) \leftrightarrow (\sim Q \rightarrow \sim P)$
 c) Obtain principle conjunctive normal form for following formula:
 $(P \wedge Q) \vee (\sim Q \wedge R)$ [4+8+4]
2. a) What do you mean by a variable & statement function in predicate calculus ?
 b) What is a Quantifier? What are various types of quantifier?
 c) Show that $\sqrt{2}$ is not a rational number, using proof by contradiction. [8+8]
3. a) What is pigeon hole principle? What are its applications?
 b) Find the inverse of following functions:
 i) $f(x) = (x+1)/x$
 ii) $f(x) = 4e^{(3x+1)}$ [8+8]
4. a) Show that intersection of two submonoids of a monoid is a monoid.
 b) Explain endomorphism & Automorphism with suitable examples. [8+8]
5. a) How many solutions are there to the equation
 $x_1 + x_2 + x_3 = 19$ where x_1, x_2, x_3 are non-negative integers with
 $x_1 > 1, x_2 > 2$ & $x_3 > 1$.
 b) State & Prove Pascal identity [8+8]
6. a) Find the generating functions for the number of integer solutions of
 $2w+3x+5y+7z = n$, $0 \leq w, x, y, z$.
 b) Find a solution for recurrence relation using the method of determined coefficients:
 $a_n - 7a_{n-1} + 12a_{n-2} = n2^n$ [8+8]
7. a) What is the significance of planar graphs? Is $k_{3,3}$ planar.
 b) Write an algorithm for depth first search spanning tree. [8+8]
8. a) Write a short note on Euler graphs.
 b) List out the rules to find chromatic number of a given graph. [8+8]