Code No: 09A30501

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year I Semester Examinations, November/December-2013
Mathematical Foundations of Computer Science
(Common to CSE, IT)

Time: 3 hours
Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a) Obtain equivalent PDNF for the propositional function $\sim(P \lor Q) \leftrightarrow (P \land Q)$.
 b) Obtain PCNF for the Propositional function $(\sim P \lor Q) \rightarrow (P \leftrightarrow \sim Q)$. [8+7]

2.a) Show that $P \rightarrow (Q \rightarrow R)$, $Q \rightarrow (R \rightarrow S) \Rightarrow P \rightarrow (Q \rightarrow S)$.
 b) Using automatic theorem proving, show that
 $(P \lor Q) \land (Q \rightarrow R) \land (P \rightarrow M) \Rightarrow (R \lor M)$. [7+8]

3.a) Draw the Hasse diagram for X= {2, 3, 6, 24, 36, 48} and relation $\leq$ be such that $x \leq y$, if x divides y.
 b) Verify the following relation R on X = {1, 2, 3, 4} is equivalence relation or not?
 Explain R = {(1, 1), (1, 4), (4, 1), (2, 2), (2, 3), (3, 4), (3, 3), (3, 2), (4, 3), (4, 4)}. [8+7]

4.a) Let X = {1, 2, 3, 4} and f : X→X such that f = {(1, 2), (2, 3), (3, 4), (4, 1)} and $F = \{f^0, f^1, f^2, f^3\}$, where $f^1 = f$, $f^2 = fOf$, $f^3 = f^2Of$ and f^0 is identity function. Verify the algebraic system (F, O) is a group, where O is composition of functions.
 b) What is a permutation group? Explain with example. [8+7]

5.a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and the other 3 will have 5 books each.
 b) Using Multinomial theorem, expand $(2x-3y+4z)^3$. [8+7]

6.a) Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2}=0$ for $n \geq 2$, $a_0=1$ and $a_1=2$.
 b) Solve the recurrence relation of Fibonacci series. [8+7]

7.a) What is circuit rank? Give an example.
 b) Apply BFS algorithm to form the spanning tree. [6+9]
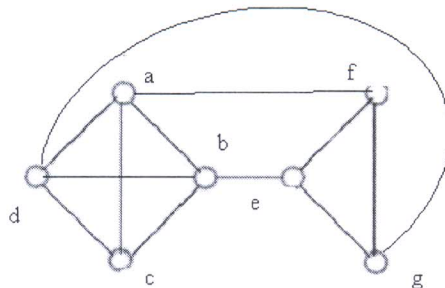
8.a)   Verify the following graphs are isomorphic or not?
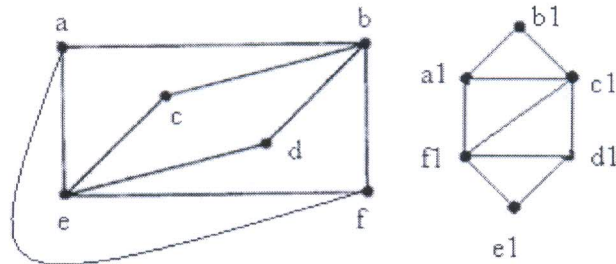
b)   Find the Chromatic Number of the following graphs
    i) Complete Graph (K_n)
    ii) Complete Bi-Partite graph $(K_{m,n})$
    iii) Cycle graphs (C_n)
    iv) Null graph (N_n).   [7+8]

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