II B. Tech I Semester Supplementary Examinations, May - 2019
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING
(Com. to CSE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Express $P \downarrow Q$ in terms of $\uparrow$ only. (4M)
   b) Write Euclidean Algorithm ? (4M)
   c) Show that $R \cap S$ is symmetric if R and S are symmetric on a set A. (3M)
   d) Perform a breadth first search on the Petersen graph. (3M)
   e) How many ways can we get a sum of 8 when two indistinguishable dice are rolled? How many ways can we get an even sum? (4M)
   f) Solve the recurrence relation $a_n - 6\,a_{n-1} + 12\,a_{n-2} - 8\,a_{n-3} = 0,\ n \geq 3$ (4M)

PART -B

2. a) Obtain the Principal disjunctive normal form of $(P \rightarrow Q) \wedge (Q \leftrightarrow R)$ (8M)
   b) Show that $S \vee R$ is tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ using Automatic Theorem Proving? (8M)

3. a) Using mathematical induction, prove that the following statement is true for all positive integers n. $1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = n(2n-1)(2n+1)/3$ for $n \geq 1$ (8M)
   b) Find the greatest common divisors of the following pairs of integers 144 and 118 (8M)

4. a) Draw the Hasse diagram for the partial ordering $\{(x,y) : x \leq y\}$ on the power set P(A) where A={a,b,c}. (8M)
   b) If R be an equivalence relation on a set A, then R^{-1} is also an equivalence relation in A. Prove. (8M)

5. a) Suppose that the tree has N vertices of degree 1, 2 vertices of degree 2, 4 vertices of degree 3 and 3 vertices of degree 4. Find N. (8M)
   b) Explain the Kruskal's algorithm with example. (8M)

6. a) In how many ways can 14 people be distributed into 6 teams where in some order 2 teams have 3 each and 4 teams have 2 members each? (8M)
   b) How many integral solutions are there for $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where each $x_i \geq 2$? (8M)

7. a) Solve the recurrence relation $a_n - 8\,a_{n-1} + 21\,a_{n-2} - 18\,a_{n-3} = 0$ for $n \geq 3$ using generating functions? (8M)
   b) Solve $a_n = a_{n-1} + n$ where $a_0 = 2$ by substitution. (8M)
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