R13

II B. Tech I Semester Supplementary Examinations, May - 2018
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 $P \leftrightarrow Q$ using $\uparrow$ only. (4M)
   b) Write Fermat's Theorem? (4M)
   c) Show that a relation R on a set A is symmetric if and only if $R = R^{-1}$ (3M)
   d) Draw the binary tree whose level order indices are { 1,2,4,5,8,10,11,20 } (3M)
   e) How many ways can we get sum of 4 or 8 when two distinguishable dice are rolled? How many ways can we get an even sum? (4M)
   f) Solve $a_n - 7a_{n-1} + 12 a_{n-2} = 0$ for $n \geq 2$ (4M)

PART –B

2. a) Obtain the Principal conjunctive normal form of $(P\wedge Q)\vee(\sim P\vee Q\vee R)$ (8M)
   b) Show that $R\wedge(P \vee Q)$ is a valid conclusion from the premises $P\vee Q$, $Q\to R$, $P\to M$ and $\neg M$. (8M)

3. a) Using mathematical induction, prove that the following statement is true for all positive integers n. $1^2 + 2^2 + 3^2 + ... + n^2 = n(n+1)(2n+1)/6$ for $n \geq 1$ (8M)
   b) Find the greatest common divisors of the following pairs of integers 81 and 36 (8M)

4. a) Let X={1,2,3,4} if R={(x,y)|(x-y) is integer non zero multiple of 2} and S={(x,y)|(x-y) is integer non zero multiple of 3} find R U S and R ∩ S (8M)
   b) Draw Hasse diagram representing the partial ordering on {(a,b) : a | b} on {1,2,3,4,6,8,12}. (8M)

5. a) Explain Depth First Search algorithm with example. (8M)
   b) What is the chromatic number of the following (8M)
      i) C_n ii) K_n iii) $K_{m,n}$ iv) tree with n vertices

6. a) In how many ways can 12 of the 14 people be distributed into 3 teams where the first team has 3 members, the second has 5, and the third has 4 members? (8M)
   b) Find the coefficient of $x_1^4 x_2^5 x_3^6 x_4^3$ in $(x_1 + x_2 + x_3 + x_4)^{18}$? (8M)

7. a) Solve the recurrence relation $a_n - 7 a_{n-1} + 10 a_{n-2} = 0$ for $n \geq 2$ using generating functions? (8M)
   b) Solve $a_n + 2n a_{n-1} - 3n(n-1)a_{n-2} = 0$. (8M)

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