Code No: RT21052 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, October/November - 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 ↑ Q interms of ↓ only. (4M)
   b) Write Division Theorem? (4M)
   c) Show that R ∩ S is transitive if R and S are transitive on a set A. (3M)
   d) Perform a depth first search on the Petersen graph. (3M)
   e) How many different license plates are there that involve 1,2, or 3 letters followed by 4 digits? (4M)
   f) Solve the recurrence relation $a_n - 8\,a_{n-1} + 21\,a_{n-2} - 18\,a_{n-3} = 0$ for $n \geq 3$ (4M)

PART -B

2. a) Obtain the Principal conjunctive normal form of $(P \rightarrow Q) \wedge (Q \leftrightarrow R)$ (8M)
   b) i) If A works hard, then either B or C will enjoy themselves. ii) If B enjoys himself, then A will not work hard. iii) If D enjoys himself, then C will not. Therefore, if A works hard, D will not enjoy himself. Show that these statements constitute a valid argument. (8M)

3. a) Find the greatest common divisors of the following pairs of integers 510 and 374 (8M)
   b) Using mathematical induction, prove that the following statement is true for all positive integers n. $1^3 + 3^3 + 5^3 + \ldots + (2n-1)^3 = n^2(2n^2-1)$ for $n \geq 1$ (8M)

4. a) Show that the relation R={(a,b) | a-b is divisible by n} is an equivalence relation on the set of integers where n be a positive integer greater than 1. (8M)
   b) If f : A → B and g : B → A are functions such that g o f : I_A and f o g = I_B then show that g= f^{-1} (8M)

5. a) Suppose that G is a non directed graph with 12 edges. Suppose that G has 6 vertices of degree 3 and the rest have degree less than 3. Determine the minimum number of vertices G can have. (8M)
   b) Prove that |E|=2|V|-2 if Graph is self dual. (8M)

6. a) In how many ways can 14 people be partitioned into 7 teams where in some order 2 teams have 3 members each, 3 teams have 2 each, and 2 teams have 1 member each? (8M)
   b) 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? (8M)

7. a) Solve the recurrence relation $a_n - 6\,a_{n-1} + 12\,a_{n-2} - 8\,a_{n-3} = 0$ for $n \geq 3$ using generating functions? (8M)
   b) Solve the recurrence relation $a_n^2 - 2\,a_{n-1}^2 = 0$ for $n \geq 1$ where $a_0 = 2$ (8M)
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