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

II B. Tech I Semester Supplementary Examinations, October/November - 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 $P \rightarrow Q$ using $\uparrow$ only. (4M)
   b) Write Euler's Theorem? (4M)
   c) Show that $R \cap S$ is reflexive if R and S are reflexive on a set A. (3M)
   d) Is a complete graph K_n planar iff $n \leq 4$. Justify. (3M)
   e) In how many ways can 10 people be seated in a row so that a certain pair of them is not next to each other? (4M)
   f) Solve the recurrence relation $a_n - 6\, a_{n-1} + 9\, a_{n-2} = 0$ (4M)

PART -B

2. a) Obtain the Principal disjunctive normal form of $(P \wedge Q) \vee (\sim P \wedge R) \vee (Q \wedge R)$ (8M)
   b) i) "If there was a ball game, then travelling was difficult. ii) If they arrived on time, then travelling was no difficult. iii) They arrived on time. Therefore, there was no ball game." Show that these statements constitute a valid argument. (8M)

3. a) Find the greatest common divisors of the following pairs of integers 1317 and 56 (8M)
   b) Using mathematical induction, prove that the following statement is true for all positive integers n. $1^2 - 2^2 + 3^2 - 4^2 + \ldots + (-1)^{n-1} n^2 = n(n+1)(2n+1)/6$ for $n \geq 1$ (8M)

4. a) Let n be a positive integer greater than 1. Show that the relation $R = \{(a,b) | a \equiv b \bmod n\}$ is an equivalence relation on the set of integers. (8M)
   b) Determine the no. of positive integers n where $1 \leq n \leq 500$ and n is not divisible by 2,3 or 5. (8M)

5. a) What are the rules for constructing a Hamiltonian path and Hamiltonian cycle? (8M)
   b) What is Planar Graph? Find whether K_5 is planar or not. (8M)

6. a) In how many ways can 14 people be partitioned into 6 teams when the first and second have 3 members each and third, fourth, fifth and sixth teams have 2 members each? (8M)
   b) How many integral solutions are there $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where each $x_1 \geq 3$, $x_2 \geq 2$, $x_3 \geq 4$, $x_4 \geq 6$, and $x_5 \geq 0$? (8M)

7. a) Solve the recurrence relation $a_n - 9\, a_{n-1} + 26\, a_{n-2} - 24\, a_{n-3} = 0$ for $n \geq 3$ using generating functions? (8M)
   b) Solve $n\, a_n + (n-1)\, a_{n-1} = 2^n$ where $a_0 = 1$ (8M)

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