Code No: R1621052 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2018
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
(Com to CSE & IT)

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 **FOUR** Questions from **Part-B**

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PART –A

1. a) Construct truth table for the compound predicate: $p\rightarrow(\neg q \wedge r)$ (2M)
   b) Draw the Hasse diagram for the power set $(P(S), \leq)$, where $S=\{1,2,3\}$. (3M)
   c) Write a note on ≡ operator in modular arithmetic. (2M)
   d) How many ways are there to arrange the letters of the word ENGINNERING? (2M)
   e) Solve the following recurrence relation using generating functions: $a_n-6a_{n-1}=0$ for $n\geq1$ and $a_0=1$. (3M)
   f) A complete binary tree has 125 edges. How many vertices does it have? (2M)

PART -B

2. a) Show that the following statement is a tautology: (7M)
   $$(\sim P\wedge(P\rightarrow Q))\rightarrow(\sim Q)$$
   b) Using automatic theorem proving, show that: (7M)
   $$(P \vee Q) \wedge(Q\rightarrow R) \wedge(P\rightarrow M) = (RVM)$$

3. a) Verify the following relation R on X = {1, 2, 3, 4} is an equivalence relation or not? Given R = {(1, 1), (1, 4), (4, 1), (2, 2), (2, 3), (3, 4), (3, 3), (3, 2), (4, 3), (4, 4)}. (7M)
   b) Given below the relation matrix, M_R of a relation R on the set {a,b,c} , find the relation matrices of $R^2 = R^oR$, $R^3=R^oR^oR$. (7M)
   $$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

4. a) Explain different tests for primality. (7M)
   b) Prove that G={-1,1,i,-i} is an Abelian group under multiplication. (7M)

5. a) What are the applications of Binomial and Multinomial coefficients? (7M)
   b) In how many ways can you select at least one king, if you choose five cards from a Deck of 52 cards? (7M)

6. a) Verify by mathematical induction that $a_n=A_1n+A_2$ is a solution to $a_n=d\ a_{n/d} + e$ where $n=d^k$. (7M)
   b) Write about partial fraction decomposition. (7M)

7. a) What is a cut vertex, cut set and bridge? Explain with suitable examples. (7M)
   b) Show that the maximum number of edges in a complete bipartiate graphs with n vertices is $n^2/4$. (7M)

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