II B. Tech I Semester Supplementary Examinations, Oct/Nov- 2017 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 PART -A 1. a) Explain free and bound variables of inference theory of predicate caluclus with (4M)examples? b) Explain congruence modulo m? (4M)c) Explain Antisymmetric, irreflexive properties of a relation with examples? (4M)d) Explain null graph? (3M)e) Explain left cosets with example? (3M)Explain abelian group with example? (4M)PART -B (8M)2. a) Show that $(\exists x) (P(x) \land Q(x)) \Rightarrow (\exists x) P(x) \land (\exists x) Q(x)$ b) Derive the following using CP rule if necessary (8M) $P \rightarrow (Q \rightarrow R)$, $Q \rightarrow (R \rightarrow S) \Rightarrow P \rightarrow (Q \rightarrow S)$ 3. a) Write pseudo code for Euclidian algorithm? find GCD of 330,616 using (8M)Euclidian algorithm b) Prove that by mathematical induction $2^n < n!$ for every positive integer greater (8M)than equal to 4? (8M)

- 4. a) Show by means of example for the sets $A \times B \neq B \times A$ and $(A \times B) \times C \neq A \times ((8M) \times C)$
 - b) Let $X = \{1, 2, 3, 4\}$ and $R = \{\langle x, y \rangle \mid x \rangle y\}$ draw the graph of R and also (8M) give its matrix.
- 5. a) Show that a graph is connected if and only if it has a spanning tree? (8M)
 - b) Explain kruskal's algorithm to find minimal spanning tree of a graph with (8M) suitable example?
- 6. a) Show that the order of each group of a finite group G is a divisor of the order of (8M) the group G.
 - b) Explain multinomial theorem and find binomial coefficient of $x^9 y^3$ in $(3x + 4y)^{12}$ (8M)
- 7. a) Solve the following recurrence relation $a_n = 5$ $a_{n-1} + 6$ $a_{n-2} = 0$, $n \ge 2$ by the (8M) generating function method with $a_{0=3}$, $a_{1=3}$.
 - b) Explain Generating function and explain various operation on generating (8M) function

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