

**II B. Tech I Semester Supplementary Examinations, May - 2019**  
**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) Write the DeMorgan's Laws of predicate logic. (2M)
- b) Let R be a Relation such that  $R = \{(x,y) \mid x \text{ divides } y\}$ . Draw the Hasse diagram for R. (3M)
- c) Define prime and coprime numbers. (2M)
- d) Compute  ${}^8P_5$  and  ${}^6C_3$ . (2M)
- e) Build a generating function for  $a_r$  = the number of integral solutions to the equation  $e_1 + e_2 + e_3 = r$  if  $0 \leq e_i \leq 3$  for each i. (3M)
- f) What is chromatic number? (2M)

**PART -B**

2. a) Without constructing the Truth Table, prove that  $(p \rightarrow q) \rightarrow q = p \vee q$ . (7M)
- b) Prove that the following argument is valid: (7M)  
 No engineers are fools. No one who is not a fool is an administrator.  
 Kumar is an engineer. Therefore Kumar is not an administrator.
3. a) Explain the theorem of principle of inclusion and exclusion for three variables, with an example? (7M)
- b) A function  $f(Z \times Z) \rightarrow Z$  is defined as  $f(x,y) = 4x+5y$ . Prove that f is onto, but not one-to-one. (7M)
4. a) State and prove Fermat's Little Theorem. (7M)
- b) Let  $G = \{-1,0,1\}$ . Verify whether G forms an Abelian group under addition. (7M)
5. a) State and prove the binomial theorem. (7M)
- b) There are 35 students and 04 teachers. In how many ways every student shakes hand with other students and all the teachers? (7M)
6. a) Explain how recurrence relations can be solved by the method of characteristic roots. (7M)
- b) Find and factor the characteristic polynomial for the recurrence relation  $a_n - 5a_{n-1} + 8a_{n-2} - 4a_{n-3} = 0$  for  $n \geq 3$ . (7M)
7. a) How a graph can be represented using adjacency matrix and incidence matrix? Give examples and pros & cons of each method. (7M)
- b) Present the Prim's algorithm for finding Minimal Cost Spanning Tree. Explain it with an example. (7M)