

**II B. Tech I Semester Supplementary Examinations, May/June - 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**

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**PART -A**

1. a) Define tautology? Explain with an example? (3M)
- b) Explain division algorithm? (3M)
- c) Define equivalence relation? (4M)
- d) Explain depth first search? (4M)
- e) Explain cyclic monoid? (4M)
- f) Explain generating function? (4M)

**PART -B**

2. a) Explain conjunctive normal form and find PCNF of (8M)  
 $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$
- b) What is mean by contradiction? Explain it with an example. (8M)
3. a) Prove that for all integers a, b, c, (i) if  $a|b$ , then  $a|bc$  (8M)  
 (ii) if  $a|b$ , and  $b|c$  then  $a|c$  for all a,b,c  $\in$  integers
- b) Prove that by mathematical induction  $3^n < n!$  whenever n is a positive integer greater than 6? (8M)
4. a) Let Z be the set of integers and let R be the relation (8M)  
 $R = \{ \langle x, y \rangle / x \in Z \wedge y \in Z \wedge (x - y) \text{ is divisible by } 3 \}$  determine the equivalence classes generated by the elements of Z?
- b) Explain the properties of binary relations in asset? And give an example of a relation which is both symmetric and anti symmetric? (8M)
5. a) Define isomorphism? And explain isomorphism with suitable example? (8M)
- b) Show that in every graph the number of vertices of odd degrees is even? (8M)
6. a) In how many ways can four students be selected out of twelve students (8M)  
 i) If two particular students are not included at all?  
 ii) Two particular students included?
- b) Show that i) inverse of each element of a group is unique (8M)  
 ii) The identity element of a group is unique
7. a) Find the particular solution of the recurrence relation  $a_{n+2} - 4a_{n+1} + 4a_n = 2^n$ ? (8M)
- b) Solve the recurrence relation  $a_n - 2a_{n-1} - 3a_{n-2} = 0$ ,  $n \geq 2$  by the generating function method  $a_0 = 3$ ,  $a_1 = 1$ . (8M)