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A-6351

Reg. No.:....

Name:.....

# Third Semester B.Tech. Degree Examination, September 2016 (2008 Scheme)

08.303 : DISCRETE STRUCTURES (RF)

Time: 3 Hours

Max. Marks: 100

PART-A

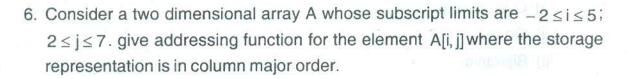
Answer all questions:

(10×4=40 Marks)

 What are the rules of well formed formulas? Check whether the following is a WFF:

$$(((A \land B) \lor C) \to (B \lor C))$$

- 2. What are free and bound variables? Give examples to each.
- 3. What is an Abelian group? Give example.
- 4. Define Boolean Algebra. Give an example.
- 5. Show that for any two sets A and B, " $A (A \cap B) = A B$ ".



- 7. Show that  $a \lor (\overline{a} \land b) = a \lor b$ .
- 8. What do you mean by tautology? Give an example.
- 9. State and explain Lagrange's theorem for cosets.
- 10. Give an example of a relation which is neither reflexive nor irreflexive.



#### PART-B

Answer one full question from each Module.

OR

### Module - I

- 11. a) Explain the rules of inference.
  - b) Demonstrate that 'R' is an inference from the premises P! Q, Q! R, and P. 10
- 12. a) Prove that

if  $H_1$ ,  $H_2$ , .....  $H_m$  and P imply Q, then  $H_1$ ,  $H_2$ , .....  $H_m$  imply  $P \rightarrow Q$  10

b) i) Show that

$$7(P \land Q) \rightarrow (7P \lor (7P \lor Q)) \Leftrightarrow (7P \lor Q)$$
.

ii) Construct a circuit diagram for a simple elevator control circuit, which operates as follows when a person pushes the button to summon the elevator to a floor, the elevator responds to this request unless it is already answering a previous call to another floor. In this latter case, the request is ignored. Assume that, there are only three floors in the building.

#### Module - II

- 13. a) Define the following functions with examples.
  - i) One-to-one
  - ii) On to
  - iii) Bijective

10

10

- b) i) Prove or disprove that if a relation on a set A is transitive and irreflexive, then it is asymmetric.
  - ii) If  $R_1$  and  $R_2$  are two equivalence relations on a set A, then prove that  $R_1 \cap R_2$  is also an equivalence relation on A. What can you say for

 $R_1 \cup R_2$ ?

10

OF

14. a) Show that set of divisors of a positive integer 'n' is recursive.

10

b) Show that  $2^n > n^3$  for n > 10.

10



## Module - III

15. a	Prove that for any commutative monoid M, *, the set of idempotent	
	elements S of M forms a sub monoid.	10
b	Show that addition of matrices form an abelian group.	10
	OR	
16. a	Show that $(Z_7,+_7,X_7)$ is an integral domain.	10
b	Show that the ring of even integers is a subring of the ring of integers.	10

