(Pages : 3) **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)**

1. What are the rules of well formed formulas ? Check whether the following is a WFF :
   $(((A \wedge B) \vee C) \rightarrow (B \vee C))$
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, "$A - (A \cap B) = A - B$".
6. Consider a two dimensional array A whose subscript limits are $-2 \leq i \leq 5$; $2 \leq j \leq 7$. give addressing function for the element $A[i, j]$ where the storage representation is in column major order.
7. Show that $a \vee (\bar{a} \wedge b) = a \vee b$.
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.

P.T.O.

PART – B

Answer **one full** question from **each** Module.

Module – I

11. a) Explain the rules of inference. 10

b) Demonstrate that 'R' is an inference from the premises P! Q, Q! R, and P. 10

OR

12. a) Prove that

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

b) i) Show that

$7(P \wedge Q) \rightarrow (7P \vee (7P \vee Q)) \Leftrightarrow (7P \vee Q)$.

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. 10

Module – II

13. a) Define the following functions with examples.

i) One- to-one

ii) On to

iii) Bijective 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

OR

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**