Printed pages:2 **Roll No.** | | | | | | | | | | | **Sub Code: RCS 301**

Paper ID:1002

B.Tech.

(SEM III) THEORY EXAMINATION 2017-18

Discrete Structures & Theory of Logic

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a. Define Eulerian path, circuit and graph

b. Let A=(2,4,5,7,8)=B ,aRb if and only if a+b<=12.Find relation matrix

c. Explain edge coloring and k egde coloring.

d. Define Chromatic number and Isomorphic graph.

e. Define union and intertersection of multiset and find for
A=[1,1,4,2,2,3],B=[1,2,2,6,3,3].

f. Find the contrapositive of –"If he has courage, then he will win".

g .Define rings and write its properties.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a. Prove by mathematical induction
$3+33+333+.....33..3 = (10^{n+1}-9n-10)/27$

b. Define the following with one example:
i) Bipartite graph.

ii) Complete graph.

iii) How many edges in K_7 and $K_{3,6}$

iv) Planar Graph.

c. For any positive integer D36, then find whether (D36,'|') is lattice or not?

d. Let X={1,2,3.....7} and R={(x,y) | (x-y) is divisible by 3).Is R equivalence relation
Draw the diagraph of R

e. Simplify the following Boolean function using K-map:
$F(x,y,z)=\sum(0,2,3,7)$

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Solve $\mathbf{a_r - 6a_{r-1} + 8a_{r-2} = r.4^r}$, given $a_0=8$, and $a_1=1$.

(b) Show that: $r \rightarrow \sim q$, $r \vee s$, $s \rightarrow \sim q$, $p \rightarrow q \leftrightarrow \sim p$ are inconsistent

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write the properties of Group. Show that the set(1,2,3,4,5)is not group under addition and multiplication modulo 6.

(b) Prove by mathematical induction
n^4-4n^2 is divisible by 3 for all n>=2.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)Explain Modular lattice, distribute lattice and bounded lattice with eg and diagram

(b) Draw the Hasse diagram of $(A, \leq)$, where

$A= \{3,4,12,24,48,72\}$ and relation $\leq$ be such that $a \leq b$ if a divides b

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Given the inorder and postorder traversal of a tree T
Inorder : HFEABIGDC Postorder : BEHFACDGI .

Determine the tree T and its Preorder.

(b) Translate the following sentences in quantified expressions of predicate logic.

i) All students need financial aid.
ii) Some cows are not white..
iii) Suresh will get if division if and only if he gets first div.
iv) if water is hot,then shyam will swim in pool.
v) All integer are either even or odd integer.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define and Explain any two the following:
1. BFS and DFS in Trees.
2. Euler Graph
3. Adjacency matrix of a graph.

(b) Solve the recurrence relation: $\mathbf{a_r + 4a_{r-1} + 4a_{r-2} = r^2}$.