Printed pages: 02 **Sub Code: ECS303**

Paper Id: | 1 | 0 | 2 | 0 | **Roll No.** | | | | | | | | | | |

B.Tech.
(SEM III) THEORY EXAMINATION 2017-18
DISCRETE MATHEMATICAL STRUCTURE

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Let A= {1, 3, 9, 27, 81} draw the Hasse diagram of the POSET(A,1).
b. How Abelian Group is different from Group.
c. What are the types of Relations?
d. Define Demorgan's law?
e. Give an example of bipartite graph.
f. Define Surjective function with an example.
g. What are properties of monoid?
h. Define equivalence relation with conditions?
i. Show that set {1, 2, 3,4,5}is not a group under adition modulo 6.
j. Define Boolean function with an example.

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Prove the following using mathematical induction
P(n)= $1 + a + a^2 + \cdots \ldots \ldots \ldots \ldots \ldots \ldots + a^n = \frac{1-a^{n+1}}{1-a}$, n≥ 1

b. Let A=(1,2,3,4) and R=((1,1)(1,3)(2,2)(2,4)(3,1)(3,3)(4,2)(4,4)) show that Relation R is an equivalence relation.
c. For the set I_4={0,1,2,3} show that the modulo 4 system is a field.
d. Let f(x)= $x^2 + 3x + 1$, g(x)= 2x-3 find fof, gof and fog.
e. Prove the following identities.
i) (A∪ B)∪(A∩ B^c)= A ii) A-B ⊆ A
iii) (A-C) ∩ (C-B) =∅ iv) (A-B)∪ (A∩ B) = A

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) If a mapping f: A→ B is one to one and Onto , then prove that inverse mapping f^{-1} : B→ A is also one to one and Onto.
(b) What are Graph? How can you represent a graph ? support it with an example.

4. Attempt any *one* part of the following: 10x 1 =10

(a) Check that following argument is valid or not ? i) P→ ¬ Q ii) R→ Q

iii) (P → Q)^ P → Q

(b) Obtain the disjunctive normal form i) P → Q^ (¬ P → Q)
ii) (P^ (P → Q)) → Q

5. Attempt any *one* part of the following: 10x1 = 10

(a) Define a cyclic group? Show that the set $\{1,w,w^2\}$ is a cyclic group of order 3 with generator w and w^2 with respect to multiplication , w being the cube root of unity.

(b) Draw the graph :

i) Graph having Euler's circuit and Hamiltonian circuit both.

ii) Graph having Euler's circuit but not Hamiltonian circuit.

iii) Graph having neither Euler nor Hamiltonian circuit.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Solve the following recurrence relation using Generating function
$a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$, r≥ 2 , a_0=1= a_1

(b) If R is a relation on the set of integers such that, (a,b)∈ R iff b= a^m for some positive integers m_0 show that R is partial ordering.

7. Attempt any *one* part of the following: 10x1 = 10

(a) Simplify following expression using k-map
Z= BD + AB^cC^c + A^cBC^c + A^cCD + $A^cB^cD^c$ also convert it into POS form.

(b) What is meant by minimum spanning tree? Explain kruskal's method to find minimum spanning tree in a Graph.