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B.Tech. (Sem. - 3rd)

DISCRETE STRUCTURES

SUBJECT CODE : CS - 203

Paper ID : [A0452]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 x 2 = 20)*

a) What do you mean by chromatic number?

b) Define Euler graph.

c) Define Semi-group.

d) Write down DeMorgan's law for set.

e) Check whether Relation | of divisibility on the set N of positive integers is an equivalence relation or not? Justify your answer.

f) Find Chromatic number for bipartite Graph ($K_{2,3}$).

g) Postfix expression for the infix expression A + B * (C + D)/F + D * E is ....

h) Write down the inclusion and exclusion principle on sets.

i) Define ring with example.

j) Find the multiplication table for G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7.

Section - B

(4 x 5 = 20)

Q2) What do you mean by cyclic group? Show that any subgroup of a cyclic group is cyclic.

Q3) Solve the recurrence relation $a_n = -3a_{n-1} + 10\,a_{n-2}$, $n \geq 2$, given $a_0 = 1$, $a_1 = -4$.

Q4) (a) Using Graph Representation of a relation how we can identify that a Relation is Reflexive, symmetric and anti-symmetric.

(b) Let X = {1, 2, 3, 4, 5, 6, 7} and R = {$(x, y) \mid x - y$ is divisible by 3} Check whether this equivalence Relation or not? Give appropriate reason in support of your answer?

Q5) Give an example of a graph and explain for the following :

(a) A Graph is having Hamiltonian and Euler Circuit.

(b) A Graph is having Hamiltonian Circuit but not an Euler Circuit.

(c) A Graph is having Euler Circuit but not an Hamiltonian Circuit.

Q6) How many integers between 1 and 300 (inclusive) are

(a) Divisible by at least one of 3, 5, 7?

(b) Divisible by 3 and 5, not by 7.

(c) Divisible by 5 but neither by 3 or 7?

Section - C

(2 x 10 = 20)

Q7) Define the following terms with help of example

(a) Ring

(b) Fields.

Q8) Consider the group G = {1, 2, 3, 4, 5} under multiplication modulo 6.

(a) Find the multiplication table of G.

(b) Prove that G is a group.

(c) Find 2^{-1}, 3^{-1} and 1^{-1}.

(d) Find the orders and subgroups generated by 2 and 3.

(e) Is G cyclic. Justify your answer.

Q9) (a) Let G = (V, E) be an undirected graph with k-components and |V| = n, |E| = m. Prove that $m \geq n - k$.

(b) Explain any two applications of Coloring of a Graph.