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Total Number of Pages : 02

B.Tech
PCS3I001

3rd Semester Regular / Back Examination 2018-19

DISCRETE STRUCTURES

BRANCH : CSE

Time : 3 Hours

Max Marks: 100

Q.CODE : E882

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Short Answer Type Questions (Answer All-10) (2 x 10)

- Define the term Multiset and power set with example.
- What are disjoint sets ? Give example.
- State De Morgan's laws in Boolean algebra.
- Define invertible function with example.
- Compare and contrast between directed graph and undirected graph.
- Prove by Boolean algebra that $a+b.c = (a.b) + (a.c)$
- Give an example of graph which has both Hamiltonian circuit and Euler's circuit.
- What do you mean by chromatic number?
- Define POSETS.
- Define shortest path in a graph with suitable diagram.

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Reduce the following Boolean expressions to complete sum of products form:
a. $f(a,b,c) = (a'+b)+a'b$ b. $f(a,b,c) = (a+b)'(ab)'$
- Prove that intersection of two equivalence relations is an equivalence relation.
- Show that $Z_7 = \{0,1,2,3,4,5,6\}$ is group under addition modulo 7.
- Define and give example of a. Homeomorphic graph b. Complete bipartite graph.
- State and prove Lagrange theorem.
- State Königsberg seven bridges problem. What is the solution to this problem. Elaborate.
- Prove that If R is an equivalence relation on a set A, show that R^{-1} is also an equivalence relation on A.
- Definition of Isomorphic graphs. Give an example.
- Show that the edge chromatic number of a graph must be at least as large as the maximum degree of a vertex of the graph.
- State and prove Lagrange theorem.
- Suppose R and S are symmetric relation on a Set A. Show that $R \cap S$ is also symmetric. b) Show the difference between symmetric and anti-symmetric relation

with example.

- I) Consider $G = \{1, 5, 7, 11\}$ under multiplication modulo 12.
a) Is G cyclic? b) Find all subgroups of G .

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Define each with example . **(16)**
a) Cut points
b) Simple graph
c) Eulerian Chain
d) Connected component in disconnected graph.
- Q4** Consider the algebraic expression $E = (x + 3y)^4(a - 2b)$. **(16)**
a) Draw the corresponding 2-tree.
b) Write E in Polish prefix form.
- Q5** What is meant by minimum spanning tree ? Explain prim's algorithm to find the minimum spanning trees. **(16)**
- Q6** Solve the recurrence relation . **(16)**
 $S(n) + 5S(n-1) + 6S(n-2) = 3n^2$ where $S(0) = 1, S(1) = 2$.