

Dr. Priyanka (DocSG)

224

09/12/22

Examination: BTech & DD  
Subject: Discrete Structure  
Time Allowed: 3 Hrs

Year: Dec 2022  
Code: CS-213

Session: July-Dec 2022  
Semester: 3<sup>rd</sup>  
Max Marks: 60

Name of student: .....

Roll No: .....

Note: Each question carries equal marks. Assume sufficient and necessary data if something missing.

- List all the inference rules. What do you mean by validity of an argument? Prove the validity of the following arguments.
  - Hypothesis1: "All hummingbirds are richly colored."  
Hypothesis2: "No large birds live on honey."  
Hypothesis3: "Birds that do not live on honey are dull in color."  
Conclusion: "Hummingbirds are small."
  - Hypothesis: "A student in this class has not read the book," and "Everyone in this class passed the exam"  
Conclusion: "Someone who passed the first exam has not read the book."
- What is Planar Graph? State and prove Euler formula for planar graph. Also discuss applications of planar graph in computer science.
  - What is binary search tree? How many bits may be required for Huffman encoding using the message 'mississippi'? Explain.
- Define group and semi-group.
  - Prove that all subgroups of a cyclic group are cyclic.
  - Consider the  $\mathbb{Q}$  set of rational numbers and let  $*$  be the operation on  $\mathbb{Q}$  defined by  $a * b = a + b - ab$ . Is  $(\mathbb{Q}, *)$  a semi group? Is it commutative also? Find the identity element for operation  $*$ .
- Define a relation  $R$  on the set of real numbers by  $(x, y) \in R$  iff  $x^2 + y^2 = 1$ . Out of six properties studied in relation, determine those properties that  $R$  satisfies also determine those properties that  $R$  does not satisfy.
  - Define Partial order set, LUB and GLB. Consider a set  $A = \{1, 2, 3, 5, 6, 15, 30\}$ . Let  $R$  be relation define on  $x, y \in A$  s.t.  $(x, y) \in R$  iff  $a/b, a \text{ divides } b$ . Prove that  $R$  is partial order set. Draw Hasse Diagram. Is it forming a lattice? Comment.
- Define Complete bipartite graph, null graph, minimum spanning tree and chromatic number of graph ( $\chi_G$ ).
  - Discuss Eulerian and Hamiltonian graph.
  - Discuss preorder, postorder and inorder traversal of binary tree.

All the Best