



Course Code: BCAS-1202

**Max.Marks: 56 – 68
minutes**

Duration: 180

Date: 26.06.2023

Note:

1. All parts of a question should be answered consecutively.
 2. Question No. 1: Extra marks will be given for examples.
 3. Question No. 2 b): Discuss the idea behind it. Related concepts, theorems, and lemma for more marks.
 4. Question No. 6 a): More marks will be given for illustration using an example.
 5. Mathematical/ Logical explanations must be given for all the questions. No marks will be given for incomplete, wrong answers without any logic.
 6. The question paper has 8 questions (2 pages).
-

1. Define and discuss any ten laws of logic using illustrative examples. (5-10)
2. a) Let $A = \{21, 22, 23, 24, 25\}$ be a set and $R = \{(21, 21), (21, 22), (22, 23), (23, 25), (23, 24), (24, 25)\}$ be a relation on A. Find R^2, R^∞ (2+2)
b) Define Equivalence relation and discuss how we can construct many equivalence relations. (3-7)
3. Consider the communication network contains n cities, and these n cities are separated (by means of communication links) in r groups. Cities inside each of the r groups have communication links between them (either directly or through other cities inside the same group), and inter-communication links are not possible among r groups. What can you say about the maximum communication links possible between different cities in the communication network? State and Prove your claim. (4)
4. a) What is the relation between Unicursal Graph and Euler Graph? Discuss using your own example.
b) Define Arbitrarily Traceable graphs and discuss the relation between Euler and Arbitrarily Traceable graphs.
c) Give an example of a graph which is Arbitrarily traceable but not Eulerian and Eulerian but not Arbitrarily Traceable. (3+2+1.5)



ABV- Indian Institute of Information Technology & Management, Gwalior

Semester II (2022-23)

Major

Course Title: Discrete Mathematical Structure

Course Code: BCAS-1202

**Max.Marks: 56 – 68
minutes**

Duration: 180

Date: 26.06.2023

5. a) Give an example of a commutative ring which is not a field. (3)
- b) Define a field with 256 elements and discuss how it differs from the other finite fields. (4)
- c) Find the multiplicative inverse of 271 mod 2273. (3)
- d) What are the different representations of a finite field with 2^n elements? (4)
6. a) Discuss: How can we construct all the spanning trees of a given connected Graph (3-6)
- b) Give five equivalent definitions of a tree and prove the definition whose proof involves Mathematical Induction. (5)
7. a) Discuss a vector space associated with the connected Graph. (4)
- b) Define a subspace and discuss one subspace associated with a given graph. (2.5)
8. Define the Incidence and Adjacency matrix associated with Graph G and discuss their properties. (5)

End of Question Paper
Best of Luck