



'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 2nd Semester Examination, 2022

CC4-COMPUTER SCIENCE (23)

DISCRETE STRUCTURES

Time Allotted: 2 Hours

Full Marks: 60

*The figures in the margin indicate full marks.
All symbols are of usual significance.*

GROUP-A

Answer any four questions

3×4 = 12

1. Define Pigeonhole principle.
2. What is Eulerian graph? Give example.
3. Find 'n' if $P(n, 2) = 72$.
4. Define one-one and onto function. Give example.
5. What is equivalence relation? Give example.
6. State De Morgan's Law.

GROUP-B

Answer any four questions

6×4 = 24

7. Prove that inclusion relation on the set of sets is an equivalence relation.
8. Suppose $f : G \rightarrow G'$ is a group homomorphism. Prove that
 $f(e) = e'$ and $f(a^{-1}) = f(a)^{-1}$
9. State and prove Euler's formula in connected maps.
10. Prove that intersection of two normal subgroups is a normal subgroup.
11. Explain asymptotic notations with the help of examples.
12. Explain Hamiltonian paths with the help of examples.

GROUP-C

Answer any two questions

12×2 = 24

13. Solve the recurrence relation:

$$a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$$

with initial conditions

$$a_0 = 2, a_1 = 5, a_2 = 15$$

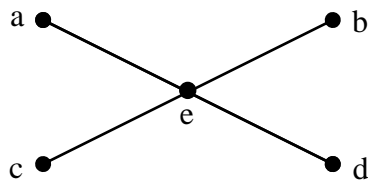
14.(a) Prove that any two cyclic groups of the same order are isomorphic.

6+6 = 12

(b) State and prove the fundamental theorem of isomorphism for groups.

15.(a) Does the graph shown below is Hamiltonian Circuit?

6+6 = 12



(b) Find the generating function of the sequence 1, 2, 3, 4, ...

16. Write short notes on the following:

(a) Well-formed formula

(b) Quantifiers.

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