CSC.152-2081 ✡

Tribhuvan University

Institute of Science and Technology

2081

✡

Bachelor Level / First Year/ Second Semester/ Science

Computer Science and Information Technology (CSC.152)

(Discrete Structure)

(VERY OLD COURSE)

Full Marks: 80

Pass Marks: 32

Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.

The figures in the margin indicate full marks.

Group A

Attempt ALL questions: **(10×2=20)**

1. List the name of two quantifiers used in predicate.
2. Define proposition.
3. What is finite state machine?
4. Give the formal definition of DFA.
5. Define tree.
6. What is recurrence relation?
7. Define graph.
8. What is cut vertices?
9. What is simple graph?
10. How do you calculate the degree of a vertex in undirected graph?

Group B

Attempt ALL questions **(5× 4 = 20)**

1. Prove that the square of even number is even using direct method.
2. Design a DFA that accepts binary string starting with 0 and ending with 1.
3. For the recurrence relation $a_n = 2a_{n-1} + 4a_{n-2}$, if $a_0 = 1$, $a_1 = 2$, then compute a_2 and a_3.
4. Define network flow and state Maxflow and Mincut theorem.
5. Explain the steps used in mathematical induction.

OR

Define context free grammar and language.

Group C

Attempt ALL questions **(5× 8 = 40)**

1. Differentiate between direct proof and indirect proof. Using mathematical induction prove that $2 + 4 + 6 + \ldots\ldots + 2n = n^2 + n$.
2. Explain the ways of representing graph with example.

OR

What is bi-partite graph and planar graph? Discuss about graph coloring with its applications.

3. Differentiate between finite state machine with output and without output. How does DFA differ with NFA? Explain.
4. Solve the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2}$ with $a_0 = 1$ and $a_1 = 2$.
5. Give the truth table for logical AND and OR operator. Define Euler path, binary tree and minimum spanning tree.

OR

List any four statements that are propositions. Discuss about pigeonhole principle.