TT#01
Marks: 20

Course: Theory of Computation (SWE 227)
Time: 50 mins

1. Let $S(n) = 1 + 2 + \cdots + n$ be the sum of the first n natural numbers and let $C(n) = 1^3 + 2^3 + \cdots + n^3$ be the sum of the first n cubes. Prove the following equalities by induction on n: **2*3 = 6**

   a. $S(n) = \frac{1}{2}n(n+1)$

   b. $C(n) = \frac{1}{4}n^2(n+1)^2$

2. What is finite automata and its application? **2**

3. What is meant by Regular Language? **1**

4. Give state diagrams of DFAs recognizing the following languages. In all parts, the alphabet is {0,1}. **2*3 = 6**

   a. {w| w is any string except 11 and 111}

   b. {w| every odd position of w is a 1}

5. Convert the given NFA to DFA. **5**