D 41454

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, JANUARY 2008

Computer Science

CS 104—THEORETICAL COMPUTER SCIENCE

(2005 admissions)

Time : Three Hours

Maximum : 80 Marks

Part A

Answer any **five** *questions.*
Each question carries 8 *marks.*

1. Construct a DFA which accepts all strings of 0's and 1's in which both the number of 0's and the number of 1's are even.

2. Prove that the regular sets are closed under intersection.

3. Define pushdown automation with example.

4. Type 0 grammars are equivalent to turning machines. Can you justify this?

5. Describe about NP-complete problems.

6. Define context free grammars with examples.

7. Define ambiguous grammar.

(5 x 8 = 40 marks)

Part B

Answer any **four** *questions.*
Each question carries 10 *marks.*

1 What is Church's hypothesis. Explain the simulation of random access machine by turning machine.

2. Prove that the language accepted by any finite automation is regular (Kleene's theorem part 2).

3. What is the principle of mathematical induction? Prove that $n! < 2^n$ for $n > 4$.

4. Describe with example (a) conjunctive normal form (b) principle conjunctive normal form.

5. Define (a) regular expression (b) Kleene closure (c) positive closure.

6. State Myhill-Nerode theorem. Explain how can we minimize a finite automata.

(4 x 10 = 40 marks)