DEGREE EXAMINATION, FEBRUARY 2013

FIRST SEMESTER M.Sc.

(CUCSS)

Computer Science

CSC 1C 03—THEORETICAL COMPUTER SCIENCE

(2010 Admissions)

Maximum : 36 Weightage

Time : Three Hours

Part A

Answer **all** *questions.*
Each question carries 1 weightage.

1. Define Automata.

2. Define Homomorphism.

3. For Σ {a, b}, construct DFA that accept the sets consisting of all strings with at least one a.

4. Define Context free grammar.

5. Give examples for left most and right most derivation.

6. Give suitable example for ambiguous grammar.

7. Define standard Turing Machine.

8. Define Type 0 grammar.

9. Define recursive language.

10. **Define P and NP classes.**

11. **Explain normal forms in propositional calculus.**

12. **Explain "Resolution".**

(12 x 1 = 12 weightage)

Part B

Answer any **six** *questions.*
Each question carries 2 weightage.

13. **Describe the languages generated by the following grammar**

   (a) S → aA

   A → bS

   S →

   (b) S → Aa

   A → B

   B → Aa.

14. xplain Boolean closure properties.

15. xplain Chomsky Normal form and Greibach Normal forms. Give examples.

D

16. Show that the string **aabbabba** is not in the language generated by the grammar

$$S \rightarrow aaB$$

$$A \rightarrow bBb \mid X$$

$$B$$

17. Discuss Church's thesis.
18. Write note on **Chomsky** hierarchy.
19. Discuss closure properties of recursively **enumerable languages.**
20. State and explain Cook's theorem.
21. Discuss NP completeness of **satisifiability.**

Part C

(6 x 2 = 12 **weightage**)

Answer **any three** *questions.*
Each question carries 4 **weightage.**

22. Discuss Pumping Lemma and proof for the existence of non-regular languages.
23. State and prove **pumping** lemma for the existence of Non-context free **languages.**
24. State and explain with example **CYK** algorithm. _____
25. With examples, explain Turing acceptable and Turing **enumerable** language classes.
26. Write notes on :

   (a) **Undecidability.**

   (b) Halting problem.

   (c) Post correspondence problem.

27. State and explain **Lowen-Skolem** theorem.

(3 x 4 = 12 weigh