Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FOURTH SEMESTER B. E. (COMPUTER) DEGREE EXAMINATION – MAY/JUNE 2006

SUBJECT: THEORY OF COMPUTATION (CSE 202)

(CREDIT SYSTEM)

Tuesday, June 02, 2006

Time: 3 Hrs. Max. Marks: 100

✍ ***Answer any FIVE full questions. Missing data if any can be assumed.***

1A. Prove by contradiction $\sqrt{2}$ is irrational.

1B. Draw a dfa for all strings with no more than 3 a's $\sum = \{a, b\}$.

1C. Define dfa and nfa.

1D. Minimize the number of states and draw the minimized dfa for the diagram depicted below:

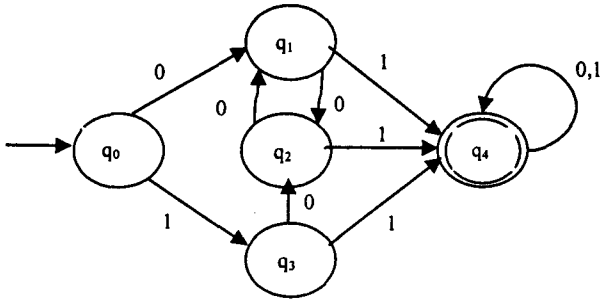

Fig Q1 (d)

(5+5+5+5 = 20 marks)

2A. Prove that $a^{n!}$ is not regular.

2B. Let G = (V, T, S, P) be a right-linear grammar; Then prove that L(G) is a regular language.

(10+10 = 20 marks)

3A. Remove unit, λ and useless production from

$s \to a|aA|B|C$, $A \to aB|\lambda$

$B \to Aa$ $C = cCD$ $D \to ddd$

3B. Show that the grammar $s \to aSbS|bSaS|\lambda$ is ambiguous.

3C. Convert the grammar $S \to ABb|a$. $A \to aaA|B$. $B \to bAb$ into Chomsky and Greibach normal form.

(9+4+7 = 20 marks)

4A. Construct a npda for $\{a^n b^n : n \geq 0\}$.

4B. Prove that the family of context free languages is closed under union, concatenation and star closure.

(10+10 = 20 marks)

5A. Design a turing machine that accepts L = $\{a^n b^n : n \geq 1\}$.

5B. Prove that the class of turing machine with stay option is equivalent to class of standard turing machine.

(10+10 = 20 marks)

6A. Prove that for any context free language there exists an npda M such that L = L(M).

6B. If S is an infinite countable set, then its power set 2^S is not countable. Prove this.

6C. Design a turing machine that performs the computation $q_0 w \vdash^* qfww$ for any $w \in \{1\}^+$ Turing machine that copies strings of 1's.

(10+5+5 = 20 marks)

7. Write short notes on:

7A. Turing machine with semi-infinite tape.

7B. Conversion and relation between regular expression, regular grammar nfa | *dfa*.

7C. Pumming lemma statement for infinite regular language and context free language.

7D. Definition for recursively enumerable language, unrestricted grammar, context sensitive grammar.

(5×4 = 20 marks)