D 27122 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

CS 04 506—THEORY OF COMPUTATION

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) Define NDFA. Give an example.

(b) Check whether the language $L = \{a^n b^n / n \geq 1\}$ is regular or not. Justify your answer.

(c) Give a CFG to generate the language L = {$w \in \{a, b\}^*$ and contains equal number of a's and b's}.

(d) Convert the grammar S → AB/aB, A → aab and B → bbA into Chomsky normal form.

(e) Explain multihead turning machines.

(f) Explain post's correspondence problem with an example.

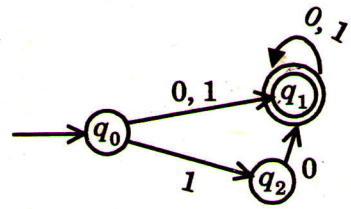
(g) Define NP and P problems. Give examples.

(h) What is the importance of study of NP complete problems ?

(8 × 5 = 40 marks)

2. (a) (i) Give the algorithm for minimizing the states of DFA. (10 marks)

(ii) Construct a regular expression for the state diagram :



(5 marks)

Or

(b) (i) Construct a NDFA equivalent to the regular expression 01* + 1. (9 marks)

(ii) Construct a DFA that accepts the language generated by the grammar :

S → aA/a, A → abB and B → bS.

(6 marks)

Turn over

3. (a) Construct a PDA to accept the language $L = \{a^n b^{2n} / n \geq 0\}$. (15 marks)

Or

(b) Construct a pushdown automata to recognize the language generated by the grammar :

$S \rightarrow aABB/aAA, A \rightarrow aBB/a, B \rightarrow bBB/A$.

(15 marks)

4. (a) Discuss briefly the different types of Turing machines.

Or

(b) Design a Turing machine that accepts the language $L = \{a^n b^n a^n b^n / n \geq 0\}$.

(15 marks)

5. (a) State node cover decision problem. Show that it is NP-complete.

Or

(b) Explain the halting problem. Show that it is NP hard problem but not NP-complete.

(15 marks)

[4 × 15 = 60 marks]