D 90183 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. [ENGINEERING] (09 SCHEME) DEGREE EXAMINATION, NOVEMBER 2015

CS/IT/PT CS 09 506—THEORY OF COMPUTATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the following questions.*

1. Why are switching circuits called as finite state systems ?
2. What are the applications of context free languages ?
3. What is a turning machine ?
4. When we say a problem is decidable ? Give an example od undecidable problem.
5. What are the concepts used in UTMs ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Show that a connected graph G with n vertices and $n-1$ edges ($n>2$) has at least one leaf.
7. Prove that if 'W' is a string of a language then there is a parse tree with yield 'W' and also prove that if $A \Rightarrow W$ then it implies that 'W' is a sting of the language L defined by a CFG.
8. What is the acceptance concept of push down Automata ?
9. Explain church's Thesis.
10. Cite example for NP hard problem.
11. What is a multi-head Turning Machine ?

(4 × 5 = 20 marks)

Part C

Answer **all** *the questions.*

12. Conversion of NFA to DFA:
    (i) Draw the NFA's transition table.
    (ii) Take the initial state of NFA be the initial state of DFA.
    (iii) Transit the initial state for all the input symbols.
    (iv) If new state appears transit it again and again to make all state as old state.
    (v) All the new states are the states of the required DFA.
    (vi) Draw the table for DFA.
    (vii) Draw the DFA from the transition table.

Or

Construct a minimized automata for the following automata to define the same language.

13. Construction of reduced grammar.

(i) Elimination of null productions.

In a CFG productions of the form $A \rightarrow \_$ can be eliminated where A is a variable.

(ii) Elimination of unit productions.

In a CFG productions of the form $A \rightarrow B$ can be eliminated, where A and B are variables.

(iii) Elimination of Useless Symbols.

These are the variables in CGF which does not derive any terminal or not reachable form the start symbols. These can also eliminated.

Or

Explain in detail the ambiguity in context free grammar.

14. Construct a turning machine to accept the language anbncn.

Or

Construct a Turning machine to perform multiplication.

15. Prove that PCP problem is undecidable and explain with an example.

Or

Prove that halting problem is undecidable.

(4 × 10 = 40 marks)