Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PECS 5304

Fifth Semester Back Examination – 2014

THEORY OF COMPUTATION

BRANCH (S) : CSE, ES12, IT

QUESTION CODE : L 298

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) Define the PDA with its tuple specifications.

   (b) Design an NFA which accepts set of all strings with two consecutive zero's.

   (c) What is the difference between DFA and NFA ?

   (d) What do you mean by a decidable problem ?

   (e) Design a Turning machine to compute n mod 2.

   (f) Discuss the Chomsky's Hirerchy of Grammars with examples.

   (g) State Church-Turing hypothesis.

   (h) What is P and NP class ?

   (i) What is undecidability ?

   (j) Differentiate between recursive and recursively enumerable language.

2. (a) Prove that a balanced parenthesis is not a regular language. 5

   (b) Explain in detail the ambiguity in context free grammar. 5

3. (a) Discuss the importance of pumping lemma with an example. 5

   (b) Show that $L = \{a^{n!} : n >= 0\}$ is not regular. 5

4. Explain in detail with an example the conversion of NFA to minimized DFA. 10

P.T.O.

5. (a) Compute the Godel number for the following sequence : 5

(i) 2, 0

(ii) 3, 0, 1

(iii) 4, 0, 3, 0

(iv) 1, 1, 1

(b) What is an Ackerman's function ? By defining the Ackerman's function find out the values of : 5

(i) A (2, 1)

(ii) A (2, 2)

6. (a) Prove that the union and intersection of two recursive languages are also recursive. 5

(b) Construct a context free grammar for the given language $L=\{a^n b^{n} / n>=1\} U \{a^m b^{2m} / m>=1\}$ and hence a PDA accepting L by empty stack. 5

7. (a) Construct a Turing Machine to do the proper subtraction. 5

(b) Discuss in detail about universal Turing machine. 5

8. Write short notes on any two of the following : 5×2

(a) Complexity class P vs NP

(b) CYK Algorithm

(c) Time Complexity class P, NP

(d) Linear Bounded Automata vs Turing Machine.