Reg. No. : | | | | | | | | | | | | |

# Question Paper Code : 31308

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fifth Semester

Computer Science and Engineering

CS 2303/CS 53/CS 1303/10144 CS 504 — THEORY OF COMPUTATION

(Regulation 2008/2010)

(Common to PTCS 2303 – Theory of computation for B.E. (Part-Time) Fifth Semester Computer Science and Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

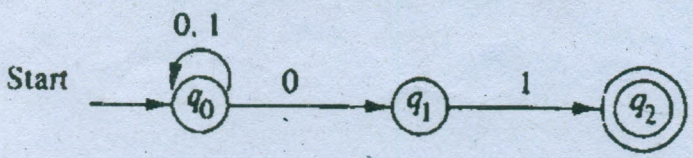
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the transition diagram (automata) for an identifier.
2. What is a non deterministic finite automaton?
3. State pumping lemma for regular languages.
4. Construct NFA equivalent to the regular expression : (0 + 1)01.
5. Write the CFG for the language $L = \{a^n b^n \mid n \geq 1\}$.
6. Compare NFA and PDA.
7. What are the closure properties of CFL?
8. List out the different techniques for Turing machine construction.
9. What are (a) recursively enumerable languages (b) recursive sets?
10. What is Universal Turing machine?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the steps in conversion of NFA to DEA. Convert the following NFA to DFA. (8)




(ii) Prove that, if L is accepted by an NFA with Є transitions, then L is accepted by NFA without Є transitions. (8)

Or

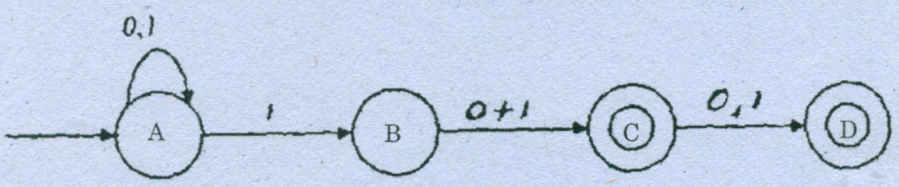
(b) (i) Prove the equivalence of NFA and DFA using subset construction. (8)

(ii) Give Deterministic finite automata accepting the following language over the alphapet.

(1) Number of 1's is a multiples of 3

(2) Number of 1's is not a multiples of 3 (8)

12. (a) (i) Convert the following NFA into a regular expression. (8)




(ii) Discuss the closure properties of regular languages. (8)

Or

(b) (i) Discuss the application of Finite automata. (6)

(ii) Using pumping lemma for regular sets prove that the language $L = \{0^{m+1}1^n0^{m+n} \mid m \geq 1 \text{ and } n \geq 1\}$ is not regular. (10)

13. (a) (i) Convert the following grammar into GNF. (8)

$S \rightarrow XY1/0$

$X \rightarrow 00X/Y$

$Y \rightarrow 1X1$

(ii) Give formal pushdown automata that accepts $\{wcw^R \mid w \text{ in } (0+1)^*\}$ by empty stack. (8)

Or

(b) (i) Show that the following grammars are ambiguous. (6)

$\{S \rightarrow aSbS/bSaS/\lambda\}$ and

$\{S \rightarrow AB/aaB,\ A \rightarrow a/Aa,\ B \rightarrow b\}$

(ii) Prove the equivalence of PDA and CFL. (10)

14. (a) (i) Explain Turing machine as a computer of integer functions with an example. (10)

(ii) Remove $\epsilon$ productions from the given grammar. (6)

Or

(b) Write short notes on the following :

(i) Two-way infinite tape TM. (8)

(ii) Multiple tracks TM. (8)

15. (a) (i) Write the classes and definition of NP problems. (6)

(ii) Prove that for two recursive languages $L_1$ and $L_2$ their union and intersection is recursive. (10)

Or

(b) (i) Prove that if a language is recursive if and only if it and its complement are both recursively enumerable. (8)

(ii) Explain about undecidability of PCP. (8)

---