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

Question Paper Code : 71684

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fifth/Eighth Semester

Computer Science and Engineering

CS 6503 — THEORY OF COMPUTATION

(Common to Information Technology)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Generate NFA-€ to represent $a^*b \mid c$.

2. Show whether a language $L = \{0^n 1^{2n} \mid n > 0\}$ is regular or not using pumping lemma.

3. Give language of regular expression $a?.(b / c)^*$.

4. Generate CFG for a signed integer constant in C language.

5. Construct a rightmost derivation of $(a + b) * c$ for using the grammar, and also state that whether a given grammar is ambiguous one or not.

   E –> E + E/E*E/(E)/id.

6. Differentiate PDA acceptance by empty stack method with acceptance by the final state method.

7. Write short notes on Chomskian hierarchy of languages.

8. What is halting problem?

9. What is primitive recursive functions.

PART B — (5 × 16 = 80 marks)

11. (a) Construct NFA with epsilon for the $RE = (a/b)^* ab$ and convert into DFA and further find the minimized DFA.

Or

(b) Prove for every $n >= 1$ by mathematical induction $\sum^{n} i^3 = \{n(n+1)/2\}^2$.

12. (a) Given the CFG G, find CFG G' in CNF generating the language $L(G) - \{\wedge\}$

S -> AACD

A -> aAb | ^

C -> aC | a

D -> aDa | bDb | ^

Or

(b) Convert the following grammar G into Greibach Normal Form (GNF)

S → XA | BB

B → b | SB

X → b

A → a

13. (a) (i) Construct a DPDA for even length palindrome.

(ii) Prove – If PDA P is constructed from CFG G by the above construction, then $N(P) = L(G)$.

Or

(b) Convert the following CFG to PDA and verify for $(a + b)$ and $a + +$

I -> a | b | Ia | Ib | I0 | I1

E -> I | E + E | E * E | (E)

14. (a) Construct a TM to reverse the given string.

Or

(b) Explain Multi tape and Multi head Turing machine with suitable example.

15. (a) Explain recursive and recursively enumerable languages with suitable example.

Or

(b) Explain tractable and intractable problem with suitable example.