Reg. No. :

Question Paper Code : 50393

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

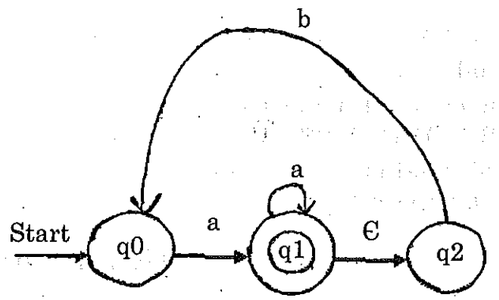
Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define finite automata.
2. State the definition of pumping lemma for regular set.
3. What are the closure properties of context-free languages ?
4. Derive a string 'aababa' for the following Context Free Grammar (CFG).
   $S \rightarrow aSX/b$;
   $X \rightarrow Xb/a$
5. Give the steps to eliminate useless symbols.
6. Show that $L = \{a^p/p \text{ is prime}\}$ is not context free.
7. Define Turing Machine.
8. Give the configuration of Turing machine.
9. List the properties of recursive and recursive enumerable language.
10. Write short notes on tractable problem.

PART – B (5×13=65 Marks)

11. a) Convert the Є-NFA to DFA and list the difference between NFA and DFA. (10+3)



(OR)

b) Show that the regular language are closed under : (13)

i) Union

ii) Inter section

iii) Kleen closure

iv) Complement

v) Difference.

12. a) i) Construct a CFG to generate even and odd set of palindromes over alphabet {a, b}. (7)

ii) Generate CFG for the language $L=\{0^i1^j0^k | j>i+k\}$. (6)

(OR)

b) i) Find an equivalent grammar in CNF for the grammar : (7)

$S \rightarrow bA/aB$

$A \rightarrow bAA/aS/a$

$B \rightarrow aBB/bS/b$.

ii) Eliminate the unit production of the following grammar : (6)

$S \rightarrow A/bb$

$A \rightarrow B/b$

$B \rightarrow S/a$.

13. a) i) Find PDA that accept the given CFG : (7)

$S \rightarrow xaax$

$X \rightarrow ax/bx/Є$.

ii) Construct PDA for the language $a^nb^ma^{n+m}$. (6)

(OR)

b) i) Prove that deterministic and non deterministic PDA are not equivalent. (8)

ii) Explain pumping Lemma for CFL. (5)

14. a) Construct Turing Machine (TM) that replace all occurrence of 111 by 101 from sequence of 0's and 1's. (13)

(OR)

b) i) Explain techniques for Turing Machine Construction. (7)

ii) Illustrate the Chomsky grammar classification with necessary example. (6)

15. a) Explain universal Turing Machine. (13)

(OR)

b) Explain how to measure and classify complexity. (13)

PART – C (1×15=15 Marks)

16. a) Prove that Halting problem is undecidable. (15)

(OR)

b) Consider two-tape Turing machine (TM) and determine whether the TM always writes a nonblank symbol on its second tape during the computation on any input string 'w'. Formulate this problem as a language and show it is undecidable. (15)

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