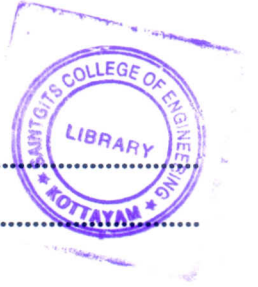


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Reg. No.....

Name.....



B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Computer Science and Engineering

THEORY OF COMPUTATION (R)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks.

1. Define a primitive recursive function.
2. Explain bijective mapping with an example.
3. Give the DFA accepting the language over the alphabet $\{0, 1\}$ that have the set of strings which does not contain 01 as substring.
4. What are the applications of finite automata ?
5. Define the pumping lemma for context free languages.
6. Design a CFG for the regular expression
 $(01 + 1)^* (01)^*$
7. Design a turing machine that accept strings belonging to the language $(a + b)^*$ from the alphabet $\{a, b\}$.
8. Define a recursive language.
9. Define a tractable problem with an example.
10. Explain a problem which is NP-hard but not NP-complete.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each question carries 12 marks.

11. Briefly explain the Chomsky classification. (12 marks)
- Or*
12. Briefly explain a partial recursive function show that the function $f(x) = \frac{x}{2}$ is a partial recursive function. (6 + 6 = 12 marks)

Turn over

13. (i) Give the DFA accepting set of all strings that when interpreted as a binary is a multiple of 5. (6 marks)
- (ii) State whether the language $h = \{0^n 1^m / n, m \geq 0\}$ is regular or not. Justify your answer. (6 marks)

Or

14. Design a DFA accepting the language over the alphabet $\{0, 1\}$ that have the set of strings start with 10. Convert it to a regular expression using any method. (4 + 8 = 12 marks)
15. Design a pushdown automata which accepts equal number of a 's and b 's over $\Sigma = \{a, b\}$. (12 marks)

Or

16. Define Chomsky Normal Form of CFG. Convert the following grammar into CNF :
 $S \rightarrow ASBB/E, A \rightarrow aAS/a, B \rightarrow SbS/A/bb$ (4 + 8 = 12 marks)
17. Design a Turing machine which accepts :
 $h = \{a^n b^n / n \geq 1\}$ over $\Sigma = \{a, b\}$. (12 marks)

Or

18. Explain the halting problem of turing machines prove that halting problem is undecidable. (6 + 6 = 12 marks)
19. Prove that directed hamiltonian circuit problem is NP-complete. (12 marks)
20. Prove that clique problem is NP-Complete. (12 marks)

[5 × 12 = 60 marks]

