

F 3331

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, DECEMBER 2007**

**Seventh Semester**

Branch : Computer Science and Engineering

**THEORY OF COMPUTATION (R)**

(Regular/Supplementary)

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 4 marks.*

1. Define countabilities and uncountability.
2. Write regular expression of set of strings with even number of  $a$ 's followed by odd number of  $b$ 's.
3. Show that the class of languages accepted by finite automata is closed under union.
4. What are useless symbols and how they can be removed ?
5. Explain properties of regular sets.
6. Define content free language.
7. How to classify the languages ?
8. What is halting problem of Turing machine ?
9. What is Turing computability ?
10. Explain classes P, NP and NP completeness.

(10 × 4 = 40 marks)

**Part B**

*Answer all questions.*

*Each question carries 12 marks.*

11. (a) Check whether the language  $L = \{a^n b^n / n \geq 1\}$  is regular or not. Justify your answer.  
(b) Explain diagonalization principle.

*Or*

12. (a) Construct NFA for  $01^* + 1$ .  
(b) Explain primitive recursive and partial recursive function.

Turn over

13. (a) Construct an automation accepting language generated by grammar  $S \rightarrow aA/a$ ,  $A \rightarrow abB$ , and  $B \rightarrow bS$ .  
(b) State and prove Pumping Lemma for regular languages.

Or

14. (a) Construct DFA for language L over the  $\Sigma = \{0, 1\}$  and  $\alpha$  is set of strings ending with "00".  
(b) Convert CFG to NFA for  $S \rightarrow ABaC$ ,  $A \rightarrow BC$ ,  $B \rightarrow b/E$ ,  $C \rightarrow D$ ,  $D \rightarrow d$ .
15. Construct PDA to accept the language given by  $\{w \in (a, b)^*/w \text{ has the same number of } a\text{'s as that of } b\text{'s}\}$ .

Or

16. Is  $\alpha = \{0^n/n \text{ is prime}\}$  is content free or not. Prove the answer.
17. Design a Turing machine that recognize the language  $\{w/w \text{ is in } (a + b)^*\}$ .

Or

18. What is Church's Thesis and Godelization ?  
19. Explain algorithmic complexity and NP hard problems.

Or

20. What is integer programming and show how it is a NP-complete problem ?

(5 × 12 = 60 marks)