Hall Ticket Number:

Code No. : 31105

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (C.S.E.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016
Automata, Languages and Computation

Time: 3 hours   Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Design a finite automaton that accepts all the strings over the alphabet {a, b}.

2. What is the length of the shortest string NOT in the language (over $\Sigma = \{a, b\}$) represented by the regular expression $a^*b^*(ab)^*a^*$

3. What are the closure properties of Regular Language?

4. Can we have more than one Minimal Finite Automata for a given language? Justify with an example.

5. State the pumping lemma for Context Free Languages.

6. Convert the following CFG to CNF.
   S->aAB
   A->aA|a
   B->bB|b

7. List the different types of Turing Machines.

8. Define instantaneous description of a Turing Machine.

9. What is restricted satisfiability problem?

10. Define recursively enumerable language.

Part-B (5 × 10 = 50 Marks)

11. a) Design a DFA to accept the language L = {w | w have even number of 0's and even number   [5]
    of 1's }.

    b) Design an NFA with three states to accept the language of the regular expression 0^*10^*0.   [5]

12. a) Consider the following DFA. Minimize the states of DFA using Table filling method.   [5]
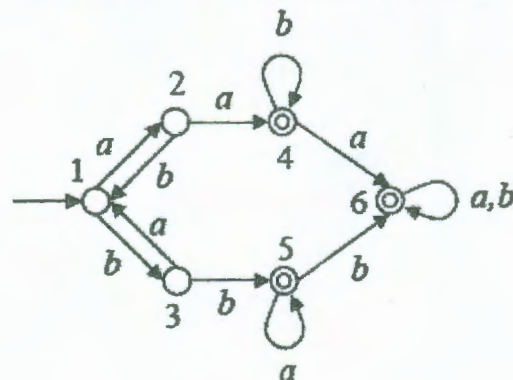
    b) Show that $\{0^i1^j \mid \gcd(i, j) = 1\}$ is not regular.   [5]

13. a) Explain CYK algorithm.   [5]

    b) Design a PDA to accept the language $L = \{a^n b^{2n} \mid n >= 1\}$.   [5]

14. a) Design a Turing machine to accept the language: $L2 = \{w \in \{a, b, c\}^* \mid \#a(w) = \#b(w) = \#c(w)\}$ [7]
      (Note: '#' means number).

    b) Why Turing Machine is considered to be powerful than PDA? Justify.   [3]

15. a) State PCP and find whether given instance of PCP has solution or not.   [5]

	List A	List B
	w_i	x_i
1	011	110
2	01	010
3	110	01

    b) Explain about P and NP classes.   [5]

16. a) Construct an Epsilon NFA for the language represented by the Regular expression 0+01*.   [5]

    b) What is Chomsky's hierarchy of languages? Explain with a neat diagram.   [5]

17. Write short notes on any *two* of the following:
    a) Greibach Normal Form.   [5]
    b) Universal Turing Machine.   [5]
    c) Closure properties of CFLs.   [5]

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