Hall Ticket Number:

Code No. : 31506 S

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (I.T.) III Year I-Semester Supplementary Examinations, May/June-2017

Theory of Automata

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 DFA for the following Language L={x01y | x and y are any string of 0's and 1's}
2. Construct a R.E for the set of the strings that consists of alternate 0's and 1's.
3. Prove that L= {ww | w in (a+b)*} is not regular.
4. Generate CFG for the following Language L = $\{0^i 1^j 0^k \mid j > i+k\}$
5. Define Greibach Normal Form.
6. Construct PDA for the following language L = $\{0^n 1^{2n} \mid n \geq 1\}$
7. What are the special features of a TM?
8. Define Non-deterministic TM.
9. Represent the relation among P, NP, NP- Hard and NP- Complete in Venn diagram.
10. Define satisfiability.

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

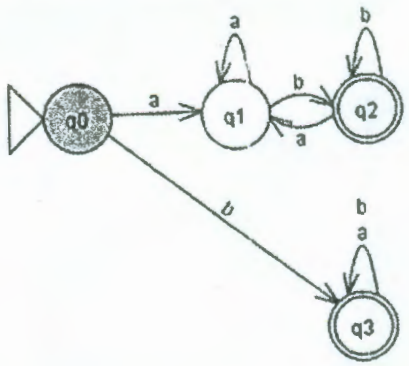
11. a) Differentiate NFA and DFA. Let r = 1(1+0)*, s = 11*0 and t = 1*0 be three regular expressions. Find the relationship between L(r), L(s) and L(t).

    b) Construct NFA without ε for a given NFA with ε where q0 and q2 are the initial and final states respectively.

	a	b	c	ε
q_0	q_0	Φ	Φ	q_1
q_1	Φ	q_1	Φ	q_2
q_2	Φ	Φ	q_2	Φ

12. a) Define CNF. Describe the procedure for converting the given grammar to CNF.

    b) Derive the CFG for the following Finite Automaton.



13. a) Design a PDA that accepts L = $\{wcw^R \mid w \in (a+b)^*\}$

    b) Find PDA that accept the CFG S→XaaX, X→aX | bX | ε

Contd…2

14. a) Discuss about restricted TM's.

    b) Design a TM for L = { $a^n b^n$ | n >= 1 }

15. a) What is post correspondence problem(pcp). Find whether the lists M = (ab, bab, bbaaa) and N = (a, ba, bab) have a Post Correspondence Solution.

    b) Define P, NP, NP-Hard and NP-complete classification of problem with an example for each.

16. a) Construct a minimum state finite automaton equivalent to the given automaton, whose transition table is given below. Here q_0 is an initial state and q_6 is a final state.

State	a	b
q_0	q_0	q_3
q_1	q_2	q_5
q_2	q_3	q_4
q_3	q_0	q_5
q_4	q_0	q_6

    b) Convert the following CFG in to equivalent grammar without ε – Productions S →aAB | BC, A→bB | b | A, B→C, C→cC | ε

17. Write short notes on any ***two*** of the following:

    a) Pumping lemma for CFL.

    b) Design of TM.

    c) Church-Turing thesis.

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