Code No. : 31105 S

VASAVI COLLEGE OF ENGINEERING (*Autonomous*), HYDERABAD
B.E. (C.S.E.) III Year I-Semester Supplementary Examinations, May/June-2017

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. Write the regular expression for the following languages.
   a) Set of strings starting with 1 and ending with 10.
   b) Set of strings with atmost two 0's.

2. Draw DFA for strings with a's and b's having three consecutive a's.

3. State the pumping lemma for regular sets and its use.

4. Identify the language generated by the following grammar.
   $$S \to aA \mid bB \qquad A \to b \mid bS \qquad B \to a \mid Sa$$

5. Name the language accepted by empty stack. Justify.

6. List the various forms of simplifying the context free grammar.

7. What is restricted Turing machine?

8. Define the language accepted by a Turing Machine.

9. Compare class NP and NP-Complete problems.

10. Define MPCP.

Part-B (5 × 10 = 50 Marks)

11. a) Design DFA for set of all strings formed with 0's and 1's such that the number of **0's** is twice the number of **1's**.   [5]

    b) Define regular expression, build NFA for the given expression (ab+b)*ab.   [5]

12. a) Define ambiguous grammar? Give suitable example for ambiguous grammar.   [3]

    b) Construct equivalent minimum state DFA for the given automata. Prove that the constructed DFA accepts the same language.   [7]
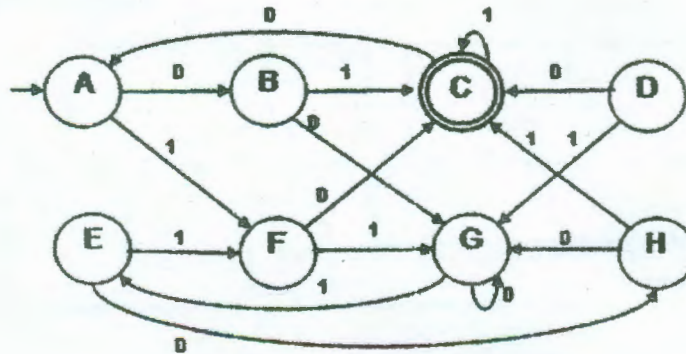
13. a) Convert the grammar to GNF.   [5]
    $$S \to AB \qquad A \to BA / a \qquad B \to SB / b$$

    b) Prove the equivalence of PDA and CFG.   [5]

14. a) Design a Turing machine M to recognize the language { ww^R / w $\in (1+0)^*$ }.   [6]

    b) Explain types of Turing Machines.   [4]

15. a) Define Post's Correspondence problem, and state whether the following instance of   [5]
    PCP has a solution. A = (110, 0011, 0110); B = (110110, 00, 110)

    b) Define the classes of P, NP Hard and NP Complete.   [5]

16. a) Write the procedure for converting NFA to DFA.   [5]

    b) State whether L = { a^p / where p is prime } is regular or not.   [5]

17. Write short notes on any *two* of the following:
    a)   Chomsky Hierarchy of languages.   [5]
    b)   Decision properties of CFL's.   [5]
    c)   Recursive and recursively enumerable language.   [5]

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