Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019
Course Code: CS301
Course Name: THEORY OF COMPUTATION

Max. Marks: 100   Duration: 3 Hours

PART A
***Answer all questions, each carries 3 marks.***   Marks

1   What is a Finite state automata?   (3)

2   Construct DFA for the language 101^* (3)

3   Give the regular expression for the language: strings of 'a' and 'b'   (3)
         containing at least two 'b'.

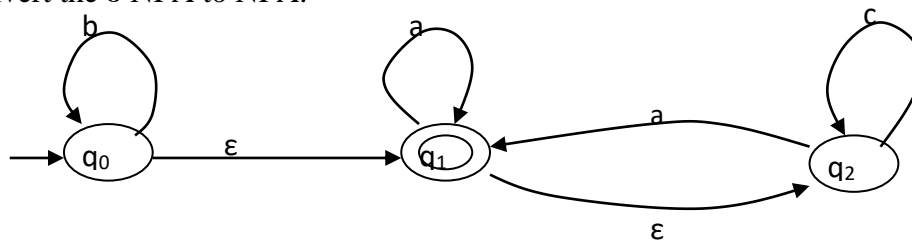4   What is a two-way finite automata?   (3)

PART B
Answer any two full questions, each carries 9 marks.

5   a)   Find the regular expression corresponding to the language of the   (4.5)
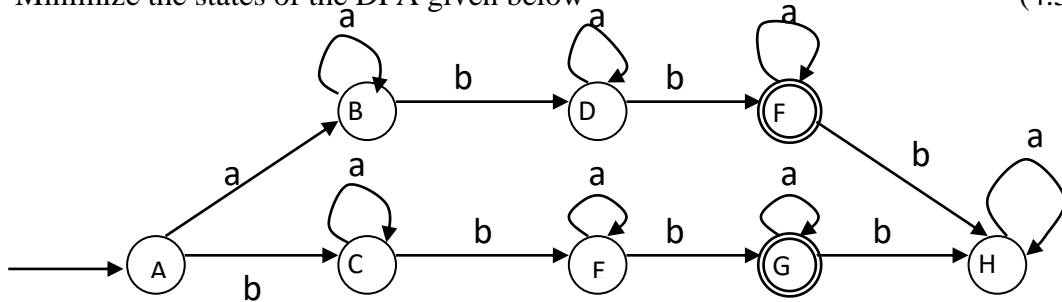   given DFA.
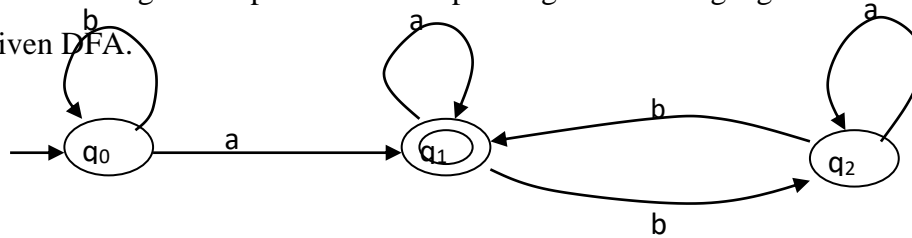
     b)   Prove the equivalence of NFA and ε-NFA.   (4.5)

6   a)   Convert the ε-NFA to NFA.   (4.5)

     b)   Prove the equivalence of regular expression and finite state automata   (4.5)

7   a)   Compare the transition functions of DFA, NFA and ε-NFA.   (4.5)

    b)   Minimize the states of the DFA given below   (4.5)

PART C
Answer all questions, each carries 3 marks.

8   Give the CFG for the language ww^R where w is string of zeroes and ones.   (3)

9   What is a derivation tree? Give an example.   (3)

10   Compare DPDA and NPDA.   (3)

11   Explain any two closure properties of CFL.   (3)

PART D
Answer any two full questions, each carries 9 marks.

12 a) Prove that the language 1^n0^n is non-regular where n>0.   (4.5)

    b) Construct PDA for the language wcw^R where w is string of zeroes and ones.   (4.5)

13 a) Prove the equivalence of PDA accepting by empty stack and final states   (4.5)

    b) Convert the grammar {S→ABaC|ABa, A→Aa|a, B→BaB|b, C→CC} to Chomsky normal form.   (4.5)

14 a) Convert to Greibach Normal form. {S→AB, A→SA|AA|a, B→SB|b}   (4.5)

    b) Prove the equivalence of CFG and PDA.   (4.5)

PART E
Answer any four full questions, each carries 10 marks.

15 a) Prove that $a^nb^nc^n$ is non-context free language where n>0.   (5)

    b) What is a Universal Turing Machine?   (5)

16 a) What is Pumping lemma for CFL?   (5)

    b) What is Halting problem?   (5)

17 a) What is Linear Bounded Automata?   (5)

    b) What is Chomsky hierarchy? Give example for each type.   (5)

18 a) Give the context sensitive grammar for the language $a^nb^nc^n$ where   (5)

n>0.

b) What is Multi-tape Turing Machine?   (5)

19 a) Design a Turing machine that accepts the language 1^n0^n where n>0.   (5)

b) What is a non-deterministic Turing Machine? Give an example.   (5)

20 a) What is a Turing machine? Give the specification of a Turing   (5)
machine and explain.

b) What is recursive and recursively enumerable languages   (5)

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