Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: CS301
Course Name: THEORY OF COMPUTATION (CS)

Max. Marks: 100   Duration: 3 Hours
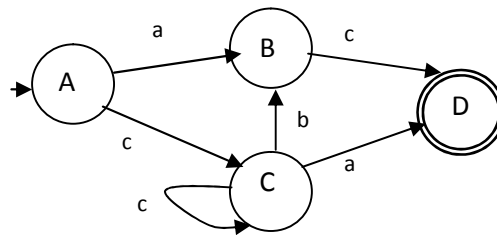
PART A
Answer all questions, each carries 3 marks.   Marks

1   What is the regular expression for the DFA   (3)
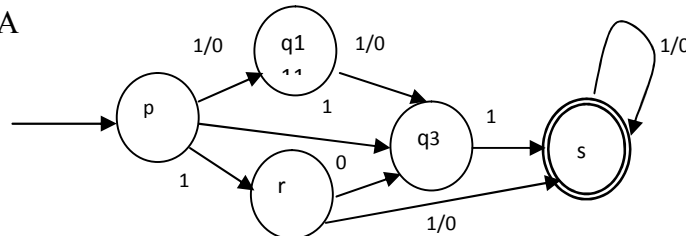

2   Compare the transition functions of NFA and DFA.   (3)

3   Explain in English language the language accepted by the DFA in Question 1.   (3)

4   What is a Moore machine? How is it different from mealy machine?   (3)

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

5   a)   Convert the NFA to DFA   (4.5)

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

6   a)   Prove the equivalence of NFA and ε-NFA.   (4.5)

     b)   Draw a six state DFA which can be minimized to a three state DFA where set   (4.5)
          of input symbols is {a, b, c}. Draw both the DFAs. Assume whatever is
          required.

7   a)   Prove the equivalence of NFA and DFA.   (4.5)

     b)   What is Myhill Nerode Theorem?   (4.5)

PART C
Answer all questions, each carries 3 marks.

8   What is a derivation tree?   (3)

9   Is the grammar {E→E+E|E-E|**id**}ambiguous? Why?   (3)

10   What is the difference between NPDA and DPDA?   (3)

11   Is the language ww^R where w is string of zeroes and ones, accepted by DPDA?   (3)
Why?

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

12 a) Show that L={0^p/ p is a prime number} is not regular.   (4.5)

     b) Construct the CFG for the union of the languages 0^n1^n and a^nb^n for n>0.   (4.5)

13 a) Convert the grammar {S→AaCb|ABa, A→bAa|a, B→BaB|b, C→c} to   (4.5)
Chomsky normal form.

     b) Construct the PDA for the language $\{0^n1^n\}^*$.   (4.5)

14 a) Give the formal definition of an NPDA.   (3)

     b) Show that NPDA and CFG are equivalent.   (6)

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

15 a) Consider L = {ww | w ∈ {0, 1}*}. Prove L is not a CFL.   (5)

     b) Explain Chomsky hierarchy and corresponding type0, type1, type2 and type 3   (5)
formalism.

16 a) Design a Turing machine that determines whether the binary input string is of   (5)
odd parity or not

     b) How does the Universal Turing machine simulate other Turing machines?   (5)

17 a) Design a Turing machine that accepts a^nb^m where n>0 and m>n.   (5)

     b) Explain why Halting problem is unsolvable problem.   (5)

18 a) What is the instantaneous description for a Turing machine? Explain with an   (5)
example.

     b) Show that normal single tape Turing machine can perform computations   (5)
performed by multi-tape Turing machine (informal explanation is sufficient).

19 a) What is a recursive language? Give an example.   (5)

     b) How does a Turing machine differ from PDA and FSA?   (5)

20 a) State pumping lemma for CFL. Mention one application of Pumping lemma   (5)

     b) What is a non-deterministic Turing machine?   (5)

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