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Roll No ....

IT-5001 (CBGS)
B.E. V Semester
Examination, December 2017
Choice Based Grading System (CBGS)
Theory of Computation
Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions.
ii) All questions carry equal marks.

1. a) Construct a DFA equivalent to an NDFA whose transition table is defined by   7

State	a	b
q_0	q_1, q_0	q_2, q_3
q_1	q_1	q_3
q_2	q_3	q_2
q_3	—	—

   b) Construct a DFA accepting all strings w over $\{0, 1\}$ such that the number of is in w is 3 mod 4.   7

2. a) Prove $(1+00*1)+(1+00*1)\ (0+10*1)*(0+10*1)$
       $= 0*1(0+10*1)*$.   7

   b) Write the identities of regular expression?   7

3. Construct a context free grammars to generate the following: 14

   i) 0^m1^m $m \geq 0$
   ii) 0^m1^n $1 \leq m \leq n$
   iii) $0^m1^n2^r$ $m = n$
   iv) $0^l1^m2^n$ $l+m = n$

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4. Construct a minimum state automation equivalent to a given automation M whose transition table is defined below: 14

State	Input a	b
$\rightarrow q_0$	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
q_5	q_1	q_4
(q_6)	q_1	q_3

5. a) Let G be the grammar
       $S \rightarrow OB|IA, A \rightarrow O|OS|IAA, B \rightarrow I|IS|OBB$
       For the string 00110101 Find: 7
       i)   LMD
       ii) RMD
       iii) Parse tree

   b) If G is the Grammar $S \rightarrow SbS|a$ show that G is ambiguous.   7

6. a) Define a PDA? Construct a PDA a equivalent to the following context free grammar $S \rightarrow OBB, B \rightarrow OS|IS|O$. Test whether 010^4 is in N(A).   7

   b) Construct a PDA for the following language   7
       i) a^nb^n $n \geq 0$ ii) $a^n b^{2n}$ $n \geq 1$

7. a) Explain P and NP type of problem? Write any three example of P or NP type problem?   7

   b) Describe decidable and undecidable problem? Explain Halting problem.   7

8. Write a short notes (any three):   14
   a) Turing machine
   b) Universal Turing machine
   c) NPDA and DPDA
   d) Closure property of regular grammar

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