

II B. Tech II Semester Regular Examinations, November - 2018
FORMAL LANGUAGES AND AUTOMATA THEORY
 (Computer science and Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

1. a) How to check acceptance of string by finite automata? (2M)
- b) Write the regular expression for the $L = \{w \in \{0,1\}^* \mid w \text{ has no pair of consecutive zeros}\}$ (3M)
- c) Discuss the Chomsky hierarchy of languages and their recognizers. (2M)
- d) How to convert the grammar to Push down automata? (2M)
- e) Differentiate Turing machine and push down automata. (3M)
- f) Give example problems of type NP-Complete. (2M)

PART -B

2. a) Design DFA to accept strings with 'c' and 'd' such that number of d's are divisible by 4. (7M)
- b) Show with an example equivalence between NFA with and without ϵ -transitions (7M)
3. a) What is a regular language? Convert the given regular expression to regular language. (7M)
 - i) $(1+c)(00^*1)0^*$
 - ii) $(0^*1^*)000(0+1)^*$
 - iii) $(00+10)^*1^*(10+00)^*$
- b) What is relationship between finite automata and regular expression? Explain the process of converting DFA to regular expression. (7M)
4. a) Generate left most and right most derivation and parse tree for given grammars (7M)

G1: $S \rightarrow 0B11A, A \rightarrow 010S11AA, B \rightarrow 111S10BB$ for the string **00110101**

G2: $S \rightarrow Ab1bA, A \rightarrow alaSlbAA, B \rightarrow blbSlbBB$ for the string **aaabbabbba**
- b) Find equivalent grammar in CNF for $S \rightarrow bA1aB, A \rightarrow bAA1aSl a, B \rightarrow aBB1bSlb$ (7M)
5. a) How to convert the following grammar to PDA that accepts the same language by empty stack $S \rightarrow 0AA \quad A \rightarrow 0S/1S/0$ (7M)
- b) What is deterministic Push Down Automata? Draw and explain a deterministic PDA for accepting $\{0^n1^n \mid n > 1\}$ (7M)
6. a) Design Turing machine to accept all set of palindromes over $\{0, 1\}^*$. And also write the transition diagram and Instantaneous description on the string 10101 (7M)
- b) Explain the general structure of multi tape and non deterministic Turing machines and show that these are equivalent to basic Turing machines. (7M)

7. a) Explain the design of universal Turing machine with its halting problem (7M)
- b) Write the definitions of P,NP problems and NP complete and NP hard problems (7M)