

**II B. Tech II Semester Supplementary Examinations, January- 2022**  
**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 **THREE** Questions from **Part-B**

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**PART -A**

1. a) What is the mathematical model of finite automata and Non-deterministic Finite Automata.? [4M]
- b) Define Moore Machine and Kleene Closure? [3M]
- c) Write the regular expression for the  $L = \{w \in \{0,1\}^* \mid w \text{ has no pair of consecutive zeros}\}$  [3M]
- d) Write about the model of Push Down Automata and context free grammar. [4M]
- e) Define Chomsky Normal Form and Turing machine halting problem? [4M]
- f) Write a Context free grammar for the language  $\{0^n 1^n \mid n \geq 1\}$ . [4M]

**PART -B**

2. a) Describe the procedure of converting NFA to DFA with a suitable example. [8M]
- b) Explain the procedure to test the equivalence of two finite state machines over set of strings 'S' with an example. [8M]
3. a) Explain the Pumping Lemma for regular sets. Show that  $L = \{a^p \mid p \text{ is a prime}\}$  is not regular. [8M]
- b) Construct a DFA for the Regular Language consisting of any number of a's and b's. [8M]
4. a) Define Context Free Grammar. State and Explain the closure properties of CFG. [8M]
- b) Find GNF equivalent to the given CFG:  $E \rightarrow E+T \mid T, T \rightarrow T * F \mid F, F \rightarrow (E) \mid id$ . [8M]
5. a)  $S \rightarrow aABB \mid aAA, A \rightarrow aBB \mid a, B \rightarrow bBB \mid a$ , construct the PDA that accepts the language generated by given grammar. [8M]
- b) Explain the followings with examples. [8M]
  - i) Sentential Forms
  - ii) Deterministic Pushdown Automata.
6. a) Discuss in detail about leftmost and right most derivation tree with example. [8M]
- b) Design a Turing machine over  $\Sigma = \{a,b\}$  to accept the language  $L = \{WWR \mid W \in (a,b)^+\}$ . [8M]
7. a) Explain Decision Properties of Context-Free Languages. [8M]
- b) Explain the concepts of Undecidable Problems about Turing Machines. [8M]