II B. Tech II Semester Supplementary Examinations, August/September – 2021
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 Finite State Machine? What are its elements? [4M]

   b) Describe the relationship between Grammars and Languages. [4M]

   c) Find out the ϵ^* and ϕ^*. [3M]

   d) Mention the applications of regular expressions. [4M]

   e) Define Mealy and Moore Machines. [3M]

   f) Every decidable language is Turing-Acceptable? Justify. [4M]

PART –B

2. a) Discuss about the classification of automata. [8M]

   b) Explain the applications of Finite State Machine in real world. [8M]

3. a) Define alphabet and language. Write the Operations that can be performed on a language with examples. [8M]

   b) Prove that if L is regular grammar the L is a regular set. [8M]

4. a) Design DFA for set of all strings whose number of a's are divisible by 5 and number of b's are divisible by 7 over $\sum = \{a,b\}$. [8M]

   b) Convert the following NFA to its equivalent DFA.

δ	0	1
→ q_0	$\{q_0, q_1\}$	q_1
*q_1	q_2	q_2
q_2	ϕ	q_2

   [8M]

5. a) Prove that regular languages are closed under homomorphism. [8M]

   b) Construct a NFA equivalent to the regular expression (10+11)*00. [8M]

6. a) Design a context free grammar for the language L= $\{W=W^R \mid W$ is in $\{a,b\}^*\}$. [8M]

   b) What is an ambiguous grammar? Show that the following grammar is ambiguous.
   $S \rightarrow AB \mid aaB$
   $A \rightarrow Aa \mid a$
   $B \rightarrow b$

   [8M]

7. a) Construct Turing Machine for multiplication of two unary numbers. [8M]

   b) Explain how P problems are different from NP problems. [8M]