Roll No……..….. **Total No. of Printed Pages: [01]**
Total No. of Questions: [09]

B. Tech. (AI & Machine Learning) (Semester – 5th)
FORMAL LANGUAGE AND AUTOMATA THEORY
Subject Code: BCSED2512
Paper ID: [22113117]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) What is a grammar?
b) What are the operators used in regular expressions?
c) What is pumping lemma for regular language?
d) What is CNF?
e) What is meant by ambiguity in grammar?
f) What is linear bounded Automata?
g) What is recursive language?
h) What is Universal Turing Machine?
i) What is Rice's theorem?
j) What is undecidability?

Section – B **(5 marks each)**

Q2. What types of string are expressed by (0 + 1) (0 + 1)1*?
Q3. What is meant by closure property of CFL?
Q4. Design a Turing Machine that accepts strings ending with a particular alphabet (to be chosen by you).
Q5. Design an Automata accepting the string (0 + 1) (0 + 1)1*.
Q6. What is Church's Turing thesis?

Section – C **(10 marks each)**

Q7. What is minimization of an Automata? Explain with an example.
Q8. How will you put a CFG to CNF? Explain with example.
Q9. How does a PDA work? Explain.