PVP 20

Code: 20BS1403

II B.Tech - II Semester – Regular Examinations – JULY 2022

FORMAL LANGUAGES AND AUTOMATA THEORY
(COMPUTER SCIENCE & ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Define Automata. Describe the model of a discrete automaton. 7 M
   b) Differentiate the NFA and DFA. 7 M

OR

2. a) Construct a DFA which is accepted any string contains even number of 0's and even number of 1's. Explain with a neat transition diagram & transition table. 7 M
   b) Differentiate the Mealy and Moore machines. 7 M

UNIT – II

3. a) Define a language. Discuss the properties of regular language. 7 M
   b) Construct a grammar accepting
   L = {w ϵ {a, b}* the number of a's in w is divisible by 3}. 7 M

OR

4. a) How to convert the DFA to regular expression with example?
   7 M

b) Construct a grammar G accepting all strings over {a, b} containing an unequal number of a's and b's. 7 M

UNIT-III

5. a) Show that the set of all non-palindromes over *{a, b}* is a context-free language. 7 M

b) Consider the following grammar G

$S \rightarrow SbS \mid a,$

Show that G is ambiguous or not. 7 M

OR

6. a) Construct a grammar in Chomsky normal form equivalent to given grammar.

$S \rightarrow aAbB$

$A \rightarrow aA \mid a$

$B \rightarrow bB \mid b$ 7 M

b) Show that $L = \{a^p \mid p \text{ is a prime}\}$ is not Context-free. 7 M

UNIT – IV

7. a) Explain the model of a pushdown automaton with a neat diagram. 7 M

b) Construct a PDA accepting the set of all strings over {0, 1} with equal number of 0's and 1's. 7 M

OR

8. a) Convert the following grammar to a equivalent PDA that accepts the same language by empty stack.

$S \rightarrow aSb \mid A$

$A \rightarrow bSa \mid S \mid A$ 7 M

b) Explain the Deterministic PDA with example. 7 M

UNIT – V

9. a) Discuss the following representations for Turing machine.
    i. By instantaneous descriptions
    ii. By transition table
    iii. By transition diagram 7 M

   b) Demonstrate various programming techniques for Turing machine. 7 M

OR

10. a) Illustrate multitape Turing machine with a neat diagram. 7 M

    b) What is Halting problem? Discuss post correspondence problem with example. 7 M