

**FOURTH SEMESTER B.Tech EXAMINATION, JULY – 2022**  
**AUTOMATA THEORY AND LOGIC**

Time: 3 Hours

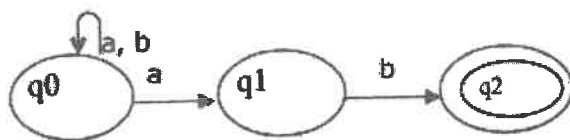
Maximum Marks: 70

**Instructions:**

- i. Answer any **FIVE** full Questions. Questions 1 and 2 are compulsory. Each question carries 14 marks.
- ii. Missing data may be suitably assumed.

1. a. Write the differences between DFA and NFA 07  
 b. Give DFA's accepting the following languages over the alphabet {0,1} 07
  - i. The set of all strings ending in 00.
  - ii. The set of all strings with three consecutive 0's (not necessarily at the end)

2. a. Convert NFA to Equivalent DFA, where q<sub>0</sub> is initial state. 07



- b. Give the regular expressions for the following: s ending with 01 or 10' 07
  - i. Strings of 0 s such that fourth symbol from the right end is 0 or 1
  - ii. Strings of 0 and sixth symbol from the right end is 1.

3. a. Is the following grammar ambiguous? 07

$B \rightarrow JCB \mid JCBEB \mid a$   
 $C \rightarrow b$

- b. Define the terms with an example 07
  - i. Sentential form
  - ii. Ambiguous grammar
  - iii. Yield of the tree
  - iv. Language

OR

4. a. Define leftmost and rightmost derivations with an example. 07  
 b. Write short notes on Applications of CFGs. 07

5. a. Define pushdown automata and discuss its applications. 07  
 b. Eliminate left recursion from the following grammar 07

$E \rightarrow E + T \mid T$   
 $T \rightarrow T * F \mid F$   
 $F \rightarrow (E) \mid Id$

**OR**

- |           |           |  |           |
|-----------|-----------|--|-----------|
| <b>6.</b> | <b>a.</b> | What is Chomsky normal form? Explain with an example.                                  | <b>07</b> |
|           | <b>b.</b> | Prove that CFLs are not closed under intersection.                                     | <b>07</b> |
| <b>7.</b> | <b>a.</b> | Explain the Turing Model.  | <b>07</b> |
|           | <b>b.</b> | What is undecidability with Halting Problem? Explain the Halting problem with example. | <b>07</b> |

**OR**

- |           |           |   |           |
|-----------|-----------|---|-----------|
| <b>8.</b> | <b>a.</b> | Explain ID with respect to TM.                      | <b>07</b> |
|           | <b>b.</b> | Explain the language accepted by TM with an example | <b>07</b> |