

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-IV Computer Science & Engineering : SUMMER : 2025**  
**SUBJECT: THEORY OF COMPUTING**

Day : Friday  
Date : 23/05/2025

S-29273-2025

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

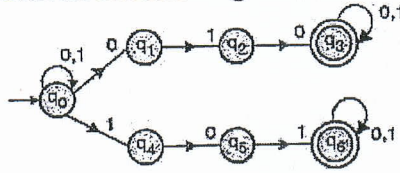
NB :

1. All questions are COMPULSORY.
2. Figures to the right indicate FULL marks for the question.
3. Draw neat labelled diagrams WHEREVER necessary.
4. Assume suitable data, if necessary.

Q. 1 Design DFA for set of all strings  $\Sigma \{0,1\}$  such that strings either begin or end with 01. (10)

**OR**

Q. 1 Convert the following NFA to the corresponding DFA (10)



Q. 2 Explain in detail Kleene's Theorem with examples. (10)

**OR**

Q. 2 Validate whether two different regular expressions describe the same language. (10)

Q. 3 Write the Grammar for the following Regular Expression (10)

- i)  $a^*$
- ii)  $(a+b)^*$

**OR**

Q. 3 Compare two CFGs and determine if they generate the same language. (10)

Q. 4 Design Push Down Automata to check odd palindromes. (10)

**OR**

Q. 4 Describe the difference between PDA acceptance by empty stack vs final state. (10)

Q. 5 Design Turing machine for string contains  $a^n b^n$  for a's and b's. (10)

**OR**

Q. 5 Design a TM to compute the multiplication of two unary numbers. (10)

Q. 6 Compare using regular expressions vs. simple string functions for pattern matching. (10)

OR

Q. 6 Explain how regular expressions help in pattern matching. (10)

\*\*\*\*\*

230525-m-coe-mumbai