

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV Computer Science & Engineering : WINTER : 2024
SUBJECT: THEORY OF COMPUTATION

Day : Saturday
Date : 30/11/2024

W-25581-2024

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Design DFA which can accept a ternary number divisible by 4. (10)

OR

Q.1 Construct an equivalent DFA for the following NFA (10)

	0	1
→ p	{p, q}	{q}
q*	{r}	{r}
r	-	{r}

Q.2 Construct Finite Automata for following R.E. (10)

- i) $(0+1)^*(010+101)(0+1)^*$
- ii) $(11)^*010(11)^*$

OR

Q.2 State and explain in detail the closure properties of regular sets. (10)

Q.3 For the Grammar given below (10)

$S \rightarrow A1B \quad A \rightarrow 0A \mid \epsilon \quad B \rightarrow 0B \mid 1B \mid \epsilon$

Give parse tree for leftmost and rightmost derivation of the string 1001.

OR

Q.3 Write equivalent left linear grammar for the following right linear grammar. (10)

$S \rightarrow 0A \quad A \rightarrow 10A \mid \epsilon$

Q.4 Design PDA that accepts $\{a^n b^m \mid n \geq 0\}$ for all a's and b's. (10)

OR

Q.4 Differentiate between Deterministic Push Down Automata and Non-Deterministic Push Down Automata. (10)

Q.5 Design TM to perform right shift operation on binary number. (10)

OR

Q.5 Design TM to accept the language (10)
 $L = \{w \mid w \in (0+1)^* \text{ containing the substring } 001\}$.

Q.6 Explain basic steps involved in the compilation process. (10)

OR

Q.6 Compare and contrast the advantages and disadvantages of using a Compiler vs. Interpreter. (10)
