

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV COMPUTER SCIENCE & ENGINEERING-A&M : SUMMER : 2024
SUBJECT: THEORY OF COMPUTATION

Day : Wednesday
Date : 22/05/2024

S-23946-2024

Time : 10:00 AM-01:00 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 Explain DFA and create DFA to accept zero or more a's. (10)

OR

- Q.1 a) Design DFA with $\Sigma = \{0,1\}$ accepts these strings which starts with 1 and ends with 0. (05)
- b) Construct NFA containing substring 1110. (05)

Q.2 Explain Regular Expression with operations on Regular Language. (10)

OR

- Q.2 Convert the following Regular Expression to their equivalent finite Automata. (10)
- i) ba^*b
 - ii) $(a+b)c$
 - iii) $a(bc)^*$

Q.3 Explain derivation Tree, with its types and example. (10)

OR

- Q.3 a) Derive the string 00101 with left most and right most derivation using CFG given (05)

$$\begin{aligned} S &\rightarrow A | B \\ A &\rightarrow 0A | \epsilon \\ B &\rightarrow 0B | 1B | \epsilon \end{aligned}$$

- b) Derive the string 'aabbabba' with left most and right most derivation using CFG. (05)

$$\begin{aligned} S &\rightarrow aB | bA \\ A &\rightarrow a | aS | bAA \\ B &\rightarrow a | bS | aBB \end{aligned}$$

Q.4 Explain conversion of CFG to PDA also construct following CFG to PDA. (10)

$$\begin{aligned} S &\rightarrow aSa \\ S &\rightarrow bSb \\ S &\rightarrow c \end{aligned}$$

OR

Q.4 a) Construct PDA for $L = \{a^n b^m c^n | n \geq 1, m \geq 1\}$. (05)

b) Construct PDA for $L = \{a^n b^n | n \geq 1\}$. (05)

Q.5 Define Turing Machines and Types of TM's. (10)

OR

Q.5 Explain languages of TM and TM as accepters. (10)

Q.6 Explain all properties of recursive and recursively enumerable languages. (10)

OR

Q.6 Explain halting problem and undividable Problems about TMs. (10)
