BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV Computer Science & Engineering : WINTER: 2025
SUBJECT: THEORY OF COMPUTATION

Day : Friday
Date : 21/11/2025

W-25581-2025

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 Design DFA for set of strings over alphabet {0, 1} such that the number of 0's is divisible by five **(10)**

OR

Q.1 Explain the concepts of Alphabet, String and Language with examples. Draw a tree for derivation of string 'abba'. **(10)**

Q.2 Construct an NFA and its equivalent DFA accepting string over {0,1}, for accepting all possible strings of 0s and 1s which do not contain 011 as substring **(10)**

OR

Q.2 Design finite automata for following Regular Expression **(10)**

i) [(a+b)* + (a*b*c*)]+(ab* + abc)
ii) 10+110*+1*0*1

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

OR

Q.3 Convert the following Right Linear Grammar to Left Linear Grammar **(10)**

$S \rightarrow 0A|1B$
$A \rightarrow 0C|1A|0$
$B \rightarrow 1B|1A|1$
$C \rightarrow 0|0A$

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

OR

Q.4 Explain Context-Free Languages (CFL). Describe how PDA is constructed from a CFG. Give one example for conversion. **(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 Turing Machine to perform right shift operation on a binary number. **(10)**

Q.6 Evaluate the significance of Cook's Theorem in computational theory. **(10)**

OR

Q.6 Explain in detail the Universal Turing machine **(10)**

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