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

Day : Friday
Date : 21/11/2025

W-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 a Deterministic Finite Automata which can accept decimal number divisible by 3 (10)

OR

Q. 1 Convert the following NFA to DFA and informally describe the language it accepts (10)

	0	1
→p	{p, q}	{p}
q	{r, s}	{t}
r	{p, r}	{t}
s*	ϕ	ϕ
t*	ϕ	ϕ

Q. 2 Design Finite Automata for the following Regular Expression (10)
[(a+b)* + (a*b*c*)]+(ab* + abc)
[10+110*+1*0*1]*

OR

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

Q. 3 Explain the terms with example (10)

i. Elimination of ε Production
ii. Removal of Useless Symbol
iii. Removal of Unit Production

OR

Q. 3 Convert the following CFG to CNF (10)

S→bA|aB

A→bAA|aS|a

B→aBB|bS|b

Q. 4 Design PDA for accepting the following language L: $\{a^n b^{2n} / n \geq 1\}$ (10)

OR

Q. 4 Design a PDA that accepts palindromes over {a, b}. (10)

Q. 5 Develop a Turing Machine that adds two binary numbers. (10)

OR

Q. 5 Design Turing machine for string contains equal number of 0's and 1's. (10)

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

OR

Q. 6 Elaborate on parsing techniques in detail. (10)

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