

BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-III Computer Science & Business Systems : SUMMER : 2025
SUBJECT: FORMAL LANGUAGE & AUTOMATA THEORY

Day : Tuesday
Date : 13/05/2025

S-29213-2025

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 Explain in brief the following with Example: (10)
i) Graph and their types
ii) Alphabet and Language

OR

Q.1 Using Pumping Lemma prove that following language is not regular: (10)
 $L = \{ 0^m 1^{m+1} / m > 0 \}$

Q.2 Design FSM to check whether a given binary number is divisible by 4. (10)

OR

Q.2 Design and Minimize the DFA for $10(0+1)^*10$. (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 NFA to DFA and informally describe the language it accepts (10)

	0	1
$\rightarrow p$	{p, q}	{p}
q	{r, s}	{t}
r	{p, r}	{t}
s^*	ϕ	ϕ
t^*	ϕ	ϕ

Q.4 Construction Push Down Automata accepting the language (10)
 $L = \{ a^{2n} b^{3n} / n > 0 \}$

OR

Q.4 Design Push Down Automata for $a^m b^{m+n} c^m$ where $m, n \geq 1$ (10)

Q.5 Construct Turing Machine for $1^n 2^n 3^n$. (10)

OR

Q.5 Design a Turing machine to accept the language generated by regular expression 00^* . (10)

Q.6 Write the applications of universal turing machine in detail. (10)

OR

Q.6 What are the formal definition of P and NP, and how do they differ? (10)
