

SE SEM-IV NEP 2020 May '2026
CMPN

Date: 12/05/2026

(Time: 2 Hours)

[Marks: 60]

N.B.: 1) All Question carry equal Marks.

2) Question No. 1 is compulsory.

3) Solve Three of the remaining Five questions.

4) Figures to the right indicate full marks.

Q.1) Answer the following questions (ANY THREE):

(a) Write a short note on Rice's theorem.

[05]

(b) Describe Chomsky Hierarchy with suitable diagram.

[05]

(c) Define pumping lemma with an example

[05]

(d) Write a short note on: Variants of Turing Machine.

[05]

Q.2) (a) Construct the minimum state automata equivalent to given DFA

[10]

	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
q_3^*	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3

(b) Explain Universal Turing Machine.

[05]

Q.3) (a) For the grammar given below

[10]

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

Give Leftmost derivation, Rightmost derivation and Parse tree of the string 10011001.

(b) Define Recursive and Recursively enumerable languages.

[05]

Q.4) (a) Design a TM to accept the language $L = \{a^n b^{2n} \mid n \geq 1\}$.

[10]

(b) Write any five closure properties of regular languages.

[05]

Q.5) (a) Design a Deterministic Finite Automata (DFA) which accepts strings with two a's and two b's over $\Sigma = \{a, b\}$.

[10]

(b) Design PDA for $L = \{a^n b^n \mid n \geq 1\}$

[05]

Q.6) (a) Construct Moore and Mealy machines for generating 1's compliment of a given binary number.

[10]

(b) Differentiate between NFA & DFA.

[05]
