

SE SEM-IV INFT C-scheme May, 2026

Date: 19/05/2026

(Time: 3 Hours)

[Marks: 80]

N.B.:

- 1) All Question carry equal Marks.
- 2) Question no. 1 is Compulsory.
- 3) Solve Three of the remaining Five questions.
- 4) Assume suitable data if necessary.
- 5) Figures to the right indicate full marks.

Q.1) Answer the following questions (Any Four)

- (a) Define Push Down Automata (PDA). State its limitations. [05]
- (b) Discuss the variants of Turing Machine (TM). [05]
- (c) Define the following terms: [05]
 - (a) Alphabet
 - (b) Grammar
 - (c) Language
 - (d) String
 - (e) Automata
- (d) Describe Mealy machine with all its tuples. [05]
- (e) Differentiate between regular grammar and context free grammar. [05]

Q.2) (a) Construct Deterministic Finite Automata (DFA) equivalent to the given [10]
 Non Deterministic Finite Automata (NFA) as given in the state
 transition table below: (p is initial state and s is final state)

State	Input	
	0	1
p	{p, q}	p
q	r	R
r	S	-
s	S	S

- (b) Write a note on Greibach Normal Form (GNF). [10]

Convert the given grammar into its equivalent GNF

$$S \rightarrow ABAb|a$$

$$B \rightarrow ABA|a$$

$$A \rightarrow a|b$$

- Q.3) (a) Consider the grammar G , $G = \{(S, A), (0, 1), P, S\}$, where P consist of: [10]

$$(i) S \rightarrow 0AS0|0$$

$$(ii) S \rightarrow S1A|SS|10$$

Show the leftmost & rightmost derivation for the input string 001100.

Is the given grammar ambiguous?

- (b) Find the possible regular expression where $L \subseteq \{a, b\}^*$ for: [05]

(a) the set of all strings ending in ab

(b) the set of all strings ending in ba

(c) the set of strings ending : neither in ab nor in ba

- (c) Define regular language and describe the closure properties of regular languages. [05]

- Q.4) (a) Define compiler. Also describe the different phases of compiler with the help of relevant diagram. [10]

- (b) Design a PDA for accepting palindromes over $\Sigma = \{a, b\}$. [10]

- Q.5) (a) Design a TM to accept the set of strings with equal number of 0's & 1 over $\{0, 1\}^*$. [10]

- (b) Differentiate between Finite State Machine (FSM) and PDA. Also list some of their applications. [10]

- Q.6) Write short notes on (Any TWO): [20]

(a) Chomsky Hierarchy

(b) Halting problem of TM

(c) Minimization of DFA
