T.E. CMPN SEM V : June 2026.

(Time: 3 hours) C-Scheme. [Marks: 80]

03/06/26

NOTE:

1. **Question No 1 is compulsory**
2. **Attempt any three questions from remaining.**
3. **Assume suitable data if necessary and state the same.**

Q1 Solve all questions below. 20

a) Differentiate between PDA and FA.

b) Define Moore machine. Design Moore machine to get 1's complement of a binary number.

c) Write down the statement of the pumping lemma for Regular Languages. With an example explain its application.

d) Design DFA for Strings starting with 2 and ending in 13 over the alphabet {1, 2, 3}.

Q2

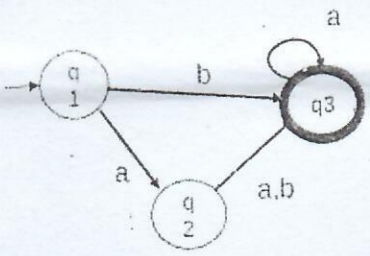
a) Design a NFA Epsilon moves for language over {a,b} having exactly two a's or two b's. Convert it to minimised DFA. 10

b) Define CNF form. Convert following grammar to CNF: P: S → ASA | aB, A → B | S, B → b | ε 10

Q3

a) Convert the following grammar to Greibach normal form (GNF): $S \rightarrow B\,S$; $S \rightarrow Aa$; $A \rightarrow b\,c$; $B \rightarrow A\,c$ 10

b) Write down Arden's Theorem. Using Arden's theorem, construct a regular expression corresponding to the state diagram shown below. 10



Q4

a) Given context free grammar having Production rule set P: S → A | ε, A → aSb | bSa | ab. Design PDA accepting the same language. 10

b) Explain the variants of the Turing machine in detail. 10

Q5

a) Design a TM that recognizes all palindromes over {a,b} 10

b) Design a Mealy machine to return 'a' for every occurrence of 010, 'b' for 110 and 'c' otherwise. Convert the same to Moore machine. 10

Q6 Write short notes on (any 4) 20

a) Closure properties of Context Free Languages.

b) Applications of Turing machine and FA.

c) Variants of Turning Machine

d) Post Correspondence Problem

e) Church Turing Hypothesis

f) Power of DPDA and NPDA
