

Bachelor of Computer Application (B.C.A.) Semester—IV (C.B.S.) Examination

THEORY OF COMPUTATION

Paper—III

Time : Three Hours]

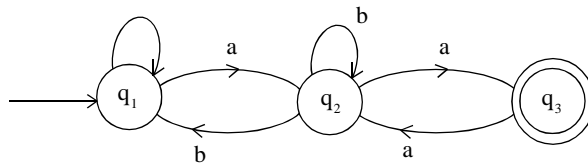
[Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and well labelled diagrams wherever necessary.

EITHER

1. (A) Find the regular expression for the following finite automata : 5



- (B) Prove that : Let L be a set accepted by NFA. Then there exist DFA that accepts L. 5

OR

- (C) Explain two-way finite automata. 5

- (D) Construct NFA for the regular expression $01^* + 1$. 5

EITHER

2. (A) Define :
 (i) Transitive closure of R
 (ii) Reflexive and transitive closure of R. 5

- (B) Define CNF. Find a grammar in CNF equivalent to :

$$S \rightarrow aAbB$$

$$A \rightarrow aA/a$$

$$B \rightarrow bB/b \quad 5$$

OR

- (C) State the Pumping lemma for regular set. What are its applications ? 5

- (D) Show that $L = \{0^i 1^i \mid i \geq 1\}$ is not regular. 5

EITHER

3. (A) Show that the following language is not context free,

$$L = \{a^n b^m c^n \mid n \leq m \leq 2n\}. \quad 5$$

- (B) (i) Chomsky Normal Form

- (ii) Greibach Normal Form. 5

OR

- (C) Explain pumping lemma for C & G. 5

- (D) Prove any two decision properties of context free languages. 5

EITHER

4. (A) Explain push down Automata. 5

- (B) Construct a PDA accepting $L = \{W \mid W \in \{a, b\}^*\}$ by final state. 5

OR

- (C) Prove that context free languages are closed under union. 5

- (D) Prove that for every CFL, there exists an equivalent push down automata. 5

5. (A) Explain the role of finite automata in Lexical Analyser. 2½

- (B) Explain Derivation trees. 2½

- (C) What is ambiguous grammar. 2½

- (D) Design a PDA accepting $\{0^n 1^{2n} \mid n \geq 1\}$ by empty stack. 2½