VIT
Vellore Institute of Technology

Continuous Assessment Test – I

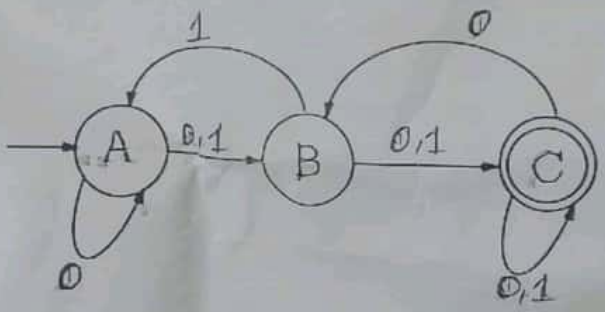
Programme Name & Branch: B.Tech CSE

Course Name & Code: CSE2002 Theory of Computation and Compilers

Slot: A2 + TA2+TAA2

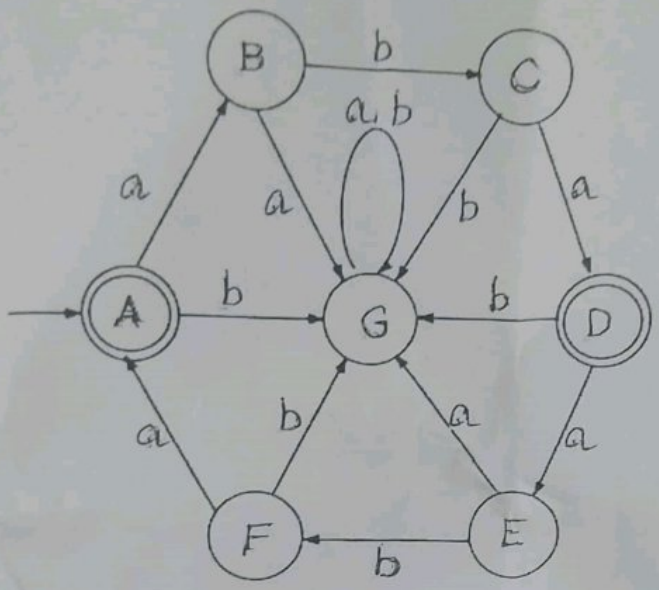
Exam Duration: 90 min

Maximum Marks: 50

S.No.	Question
1.	Consider the grammar G with T = { a } and P = { S → ECaF | a | ε , Ca → aaC , ED → EC , CF → DF | K , aD → Da, aK → Ka , EK → ε } a) Find the type of the grammar. [2] b) Find the language of the grammar. Justify your answer. [5]
2.	a) Show the translation for an assignment statement: a:= b + c * 70, where a, b, and c are real numbers. Clearly indicate the output of each phase of the compiler. [4] b) Construct DFA for the regular expression (a/b)*a (a/b) using direct method or by subset construction method. [6]
3.	Construct an equivalent DFA for the following NFA. Also find the regular expression for the language accepted by this automaton. [3+4] 
4.	a) If L is regular then show that $L_1 = \{ w^R \mid w \in L \}$ is also regular. [4] b) The star height of a regular expression r over Σ, denoted by sh(r), is defined as follows: i) sh(ϕ) = 0 ii) sh(ε) = 0 iii) sh(a) = 0, for every a ∈ Σ iv) sh((rs)) = sh((r+s)) = max (sh(r) , sh(s)) v) sh((r*)) = sh(r) + 1 Find the star height of the following regular expression [5] (aa (a + a*aa) + aaaa)* c) Prove or refute the following statements i) Let L = { $a^n b^n$ / n ≥ 0} and L^c = { $a^l b^m$ l, m > 1, m ≠ n}. Is L^c is complement of L ? [2]

ii) The regular expressions $(10 + 1)^*$ and $((10)^* 1^*)^*$ are equivalent. [2]

5. a) When do you say two states are equivalent in DFA? When are they distinguishable? What do you mean by a distinguishable sequence? Consider the DFA in the following figure. **A** is the initial state and **A** and **D** are final states. Which states are equivalent? Which states are distinguishable? Find the minimum state automaton. [8]



b) State pumping lemma for regular languages and show that $L = \{a^{n!} / \ n \geq 1\}$ is not regular. [5]