VIT

Vellore Institute of Technology

School of Computer Science and Engineering

Subject: TOC and Compiler Design – CSE2002

A1+TA1+TAA1-Slot CAT-I (Aug-2019)

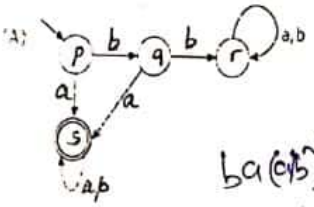
Time: 90 Minutes **Max.Marks:50**

Answer ALL questions
(5 X 10 = 50 marks)

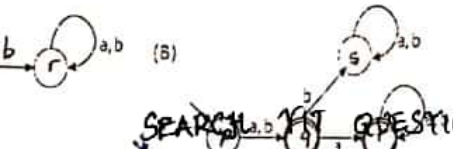
1A. i) Design DFA accepting Binary numbers divisible by number '5' (3+2)

ii) Which of the following finite state machines is a valid minimal DFA which accepts the same language as L? Justify your answer

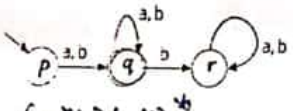
(A)



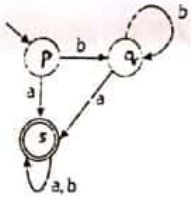
(B)



(C)



(D)



1B. Draw a 4-state Deterministic finite automata (DFA) that accepts the set of all bit strings ending with 11. (Each state represents whether the input string read in so far ends with 00, 01, 10, or 11.) Draw a 3-state DFA that accomplishes the same task. (5)

2A. Write regular expressions for each of the following languages over the alphabet {0,1}. (1+1+3)

i) The set of all strings in which every pair of adjacent zeros appears before any pair of adjacent ones.

ii) The set of all strings not containing 101 as a substring.

iii) Consider the following statement: "If A is a non-regular language and B is a language such that $B \subseteq A$, then B must be non-regular." If the statement is true, give a proof. If it is not true, give a counter example showing that the statement doesn't always hold.

2B. i) The *nor* of two languages is ***nor*** (L1, L2) = {w: w ∉ L1 and w ∉ L2}. (2+3)
Show that the family of regular languages is closed under the ***nor*** operation.

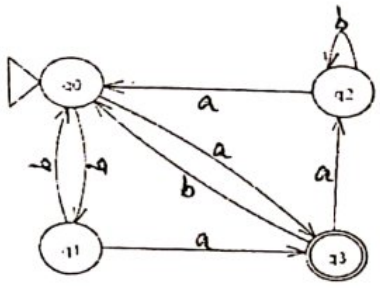
ii) Prove that $A_1 = \{ w \in \{a, b\}^* \mid w \text{ has more a's than b's} \}$ is not Regular.

3. Let L be the language { abx | x is any string of a's and b's not containing the substring ab }.

(1+2+7)

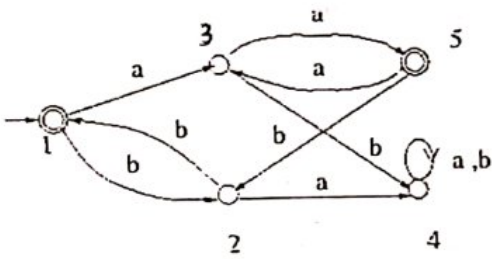
a. Construct a regular expression for L.
b. For the above regular expression construct a nondeterministic finite automaton (NFA- ε) for L using the Thompson algorithm.
c. For the above NFA-ε construct an equivalent deterministic finite automaton (DFA).

4A. Convert the given DFA into Regular Expression notation using Arden's Theorem without minimization. (7)



4B. Define distinguishable and indistinguishable of state Q, R (3)

5A. Construct the Minimized DFA for the following. (5)



5B. Discuss the Phases of Compiler in detail. (5)