

**Anjuman Islam Janjira Degree College of Science**  
**Murud-Janjira, Raigad-402401**  
**Affiliated to University of Mumbai**

<b>Class: -S.Y.B.Sc C.S</b>	<b>Subject: - Theory Of Computation</b>
<b>Semester:- IV</b>	<b>Course code: -USCS401</b>
<b>Exam Event:- Summer 2024</b>	<b>Marks: -75</b>
<b>Date: - 01/04/2024</b>	<b>Duration: - 02:30 Hours</b>

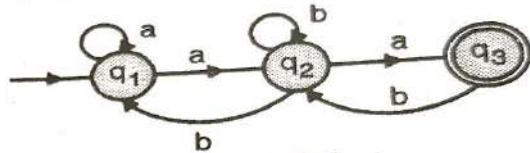
- N.B. –**
- 1 – All questions are compulsory.
  - 2 – All questions have internal choice.
  - 3 – Figures to the right indicate full marks.

**Q1. Answer the following question (4 out of 6) 20**

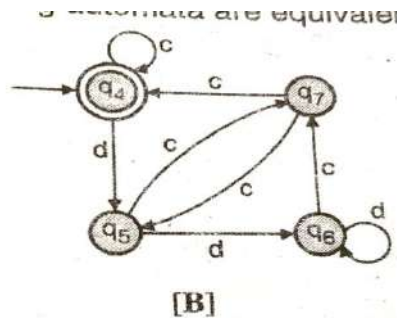
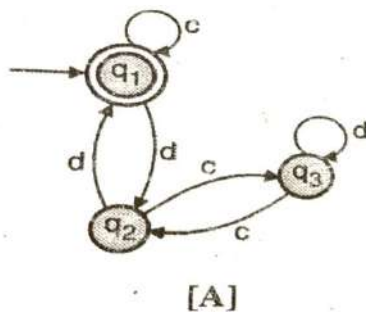
1. Define TOC & its different Types of Layers.
2. Consider a grammar given below & our task is to generate a language which can have more than one string by using the given grammar  $S \rightarrow AS/BS/a$ .
3.  $L = \{\text{Set of all strings over } \{0,1\} \text{ that starts with } 0\}$  Construct an NFA for the above language and then convert it into its equivalent DFA.
4. Construct a Moore machine that prints 'a' whenever the sequence 01 is encountered in any input binary string.
5. Difference between DFA and NFA.
6. Explain Chomsky Classification of grammar.

**Q2. Answer the following question (4 out of 6) 20**

1. Using Pumping Lemma, Prove that the language  $A = \{a^n b^n \mid n \geq 0\}$  is not regular.
2. Prove that Arden's theorem  $R = Q + RP$  has a unique solution i.e.  $R = QP^*$
3. Explain Derivation tree with its example.
4. Find Regular Expression for the following NFA.



5. Convert the following regular expression to their equivalent finite automata
  - a.  $ba^*b$
  - b.  $(a+b)c$
  - c.  $a(bc)^*$
  - d.  $(a|b)^*(abb|a^*b)$
6. Check these two automata are equivalent or not.



**Q3. Answer the following question. (4 out of 6)**

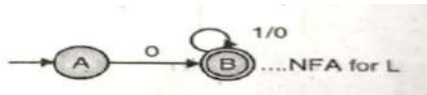
**20**

1. Explain attributes of UTM.
2. Explain Variants of Turing Machine.
3. Defining a Turing Machine which recognize the language  $L=0^N1^N$ .
4. What are the types of Unsolvability problem?
5. Explain Halting Problem.
6. Define Push down automata.

**Q4. Answer the following question. (5 out of 6)**

**15**

1. Explain Right Derivation Tree.
2. Define DFA and NFA.
3. Write Transition Properties in detail.
4. Construct  $10+(0+11)0^*1$  Convert the following regular expression to their equivalent finite automata.
5. Construct set of all string over  $(0,1)$  that states with 0 in conversion of NFA to DFA.



6. Explain Automaton Types and Automaton Labels.