

**B.TECH. SEM -V ( COMPUTER) 2014 COURSE (CBCS) :**

**SUMMER - 2018**

**SUBJECT : FORMAL LANGUAGES & AUTOMATA THEORY**

Day : **Monday**  
Date : **21/05/2018**

**S-2018-2334**

Time : **10.00 AM TO 01.00 PM**  
Max. Marks : 60

**N.B.**

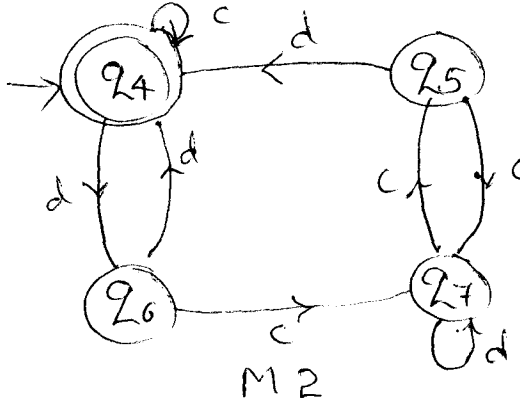
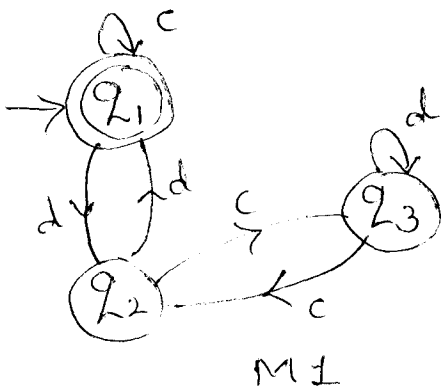
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is allowed.
- 4) Assume suitable data if necessary.

- Q.1 a)** Construct NFA and its equivalent DFA for accepting a language defined over  $\Sigma = \{0,1\}$  such that each string has two consecutive zero's followed by 1. **(05)**
- b)** Construct the minimum state DFA equivalent to given DFA. **(05)**

	0	1
→ q <sub>0</sub>	q <sub>1</sub>	q <sub>0</sub>
q <sub>1</sub>	q <sub>0</sub>	q <sub>2</sub>
q <sub>2</sub>	q <sub>3</sub>	q <sub>1</sub>
*q <sub>3</sub>	q <sub>3</sub>	q <sub>0</sub>
q <sub>4</sub>	q <sub>3</sub>	q <sub>5</sub>
q <sub>5</sub>	q <sub>6</sub>	q <sub>4</sub>
q <sub>6</sub>	q <sub>5</sub>	q <sub>6</sub>
q <sub>7</sub>	q <sub>6</sub>	q <sub>3</sub>

**OR**

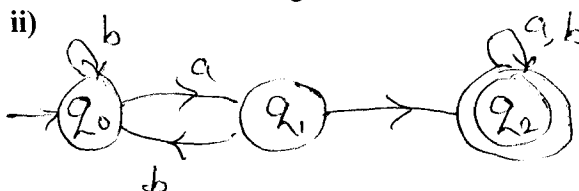
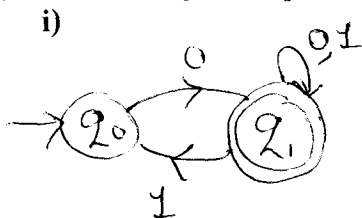
- a)** Show whether the automata M<sub>1</sub> and M<sub>2</sub> are equivalent or not. **(05)**



- b)** Design NFA and DFA where string start with 01 and end with 10 over (0, 1). **(05)**

- Q.2 a)** Design Moore and Mealy machine for output is 1 the input string end with bab. **(05)**

- b)** Find the regular expression for the DFA shown in figure. **(05)**



**P.T.O.**

**OR**

- a) Draw DFA for a following regular expression: (05)  
i)  $[00 + 11 + (01 + 10) (00 + 11)^* (01 + 10)]^*$   
ii)  $[11 + 00]^*$
- b) Construct Mealy machine that accept string ending in '00' and '11'. Convert (05)  
the same to Moore machine.

- Q.3** a) Convert the following CFG to CNF. (05)  
 $S \rightarrow aSa|bSb|a|b|aa|bb$
- b) Write the grammar generating all strings consisting of a's and b's with at least (05)  
two a's.

**OR**

- a) Give the GNF for following CFG. (05)  
 $S \rightarrow AB$   
 $A \rightarrow BS|b$   
 $B \rightarrow SA|a$
- b) Write CFG for the following languages. (05)  
i)  $\Sigma = \{a,b\}$  number of a's = number of b's  
ii)  $\Sigma = \{a,b\}$  number of a's is multiple of 3

- Q.4** a) Design PDA to recognize the language generated by following grammar. (05)  
 $S \rightarrow SS|(S)|()$
- b) Construct PDA accepting language consisting of even palindromes string a's (05)  
& b's.

**OR**

- a) Construct PDA that checks the well formedness of parenthesis. (05)
- b) Construct the PDA to check whether a given string over  $\{a,b\}$  ends in abb. (05)

- Q.5** a) Design Turing Machine to find the 1's complement and 2's complement of (05)  
any binary input.
- b) Design Turing Machine to increment a binary number by 1. (05)

**OR**

- a) Design Turing Machine that replaces all occurrences of 111 by 101 from (05)  
sequence of 0's and 1's.
- b) Design Turing Machine for equal number of a's and b's. (05)

- Q.6** a) Write a short note on natural language processing. (05)
- b) Describe in brief the term lexical analyzer. (05)

**OR**

- Write short notes on : (10)
- i) Applications of Turing machine  
ii) Text editor  
iii) Applications of PDA  
iv) Application of CFG

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