

Total No. of Questions : 6]

SEAT No. :

P67

Oct./TE/Insem.-186

[Total No. of Pages : 2

T.E. (Computer Engineering)

THEORY OF COMPUTATION

(2015 Course) (Semester - I) (310241)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Attempt questions Q1 or Q2, Q3 or Q4, and Q5 or Q6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.

Q1) a) Define the following terms with example- [3]

- i) DFA ii) NFA iii) epsilon NFA

b) Construct NFA with ϵ moves which accepts a language consisting the strings of any number of a's followed by any number of b's, followed by any number of c's. [3]

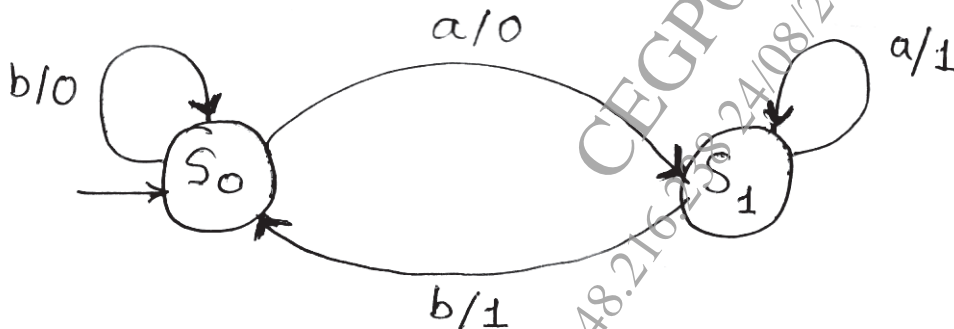
c) Design Finite Automata (FA) for accepting strings over $\Sigma = \{0,1\}$ with even numbers of 0's and odd number of 1's. [4]

OR

Q2) a) Compare Moore machine and Mealy machine. [2]

b) Construct a Mealy Machine which can output EVEN/ODD if the total number of 1's in the input is even or odd. The input symbols are 0 and 1. [4]

c) Convert the following Mealy Machine to Moore machine [4]



P.T.O.

- Q3)** a) Define the following terms: [2]
 i) Kleene closure ii) Positive closure
 b) i) Illustrate in English the language of the following regular expression:
 $(1 + \epsilon) (00^*1)^*0^*$ [2]
 ii) Explain in brief, applications of regular expressions. [2]
 c) Determine a regular expression over the alphabet $\Sigma = \{a, b\}$. [4]
 i) All strings that contain an even number of 'b's
 ii) All strings that do not end with 'aa'

OR

- Q4)** a) Justify if true or false the following: [3]
 Every subset of a regular language is regular
 b) Explain the applications of regular expression in GREP utilities in Unix. [3]
 c) Construct minimized DFA accepting language represented by regular expression $0^*1^*2^*$. Convert given regular expression to NFA with ϵ moves. [4]

- Q5)** a) Discuss applications of Context Free Grammar in XML. [3]
 b) Construct the Context Free Grammar for the language having any number of a's over the set $\Sigma = \{a\}$. [3]
 c) Simplify the grammar: [4]
 $S \rightarrow Ab, A \rightarrow a, B \rightarrow C|b, C \rightarrow D, D \rightarrow E, E \rightarrow a$

OR

- Q6)** a) Discuss applications of Context Free Grammar in Syntax Analysis of a Compiler. [3]
 b) Describe the language L for given Context Free Grammar $G = [\{S\}, \{a,b\}, P, \{S\}]$ where $P = \{S \rightarrow aSb, S \rightarrow ab\}$. [3]
 c) Optimize the CFG given below by reducing the grammar where S is a start symbol. [4]
 $S \rightarrow A | 0C1$
 $A \rightarrow B | 01 | 10$
 $C \rightarrow \epsilon | CD$

