

[5353] - 581

TE. (Computer Engineering)
THEORY OF COMPUTATION
(2015 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Construct DFA for language defined by $\Sigma = \{a, b\}$ where **[6]**
S = (strings containing only a's)
S = (strings containing only b's)
S = {strings containing only a's or b's)
- b) Explain the application of Regular expressions in Text Search and Replace **[6]**
- c) Write short notes on **[8]**
i) Chomsky Normal Form
ii) Greibach Normal Form

OR

- Q2)** a) Design a FA which checks the divisibility by 3 for a binary number input. **[6]**
- b) With Respect to properties of regular languages explain what is pumping lemma and closure properties of regular languages. **[6]**
- c) State significance of normalization process for grammar. **[8]**

Let G be a CFG with productions

$S \rightarrow AB \quad I \in$

$A \rightarrow a$

$B \rightarrow b$

Convert G in CNF.

P.T.O.

- Q3)** a) Define Turing machine. Explain recursively enumerable sets. [4]
 b) Write short notes on - [6]
 i) Non Deterministic TM
 ii) Composite TM
 iii) Halting problem of TM
 c) Obtain a Turing Machine to accept a language [8]
 $L = \{0^n 1^n, n \geq 1\}$.

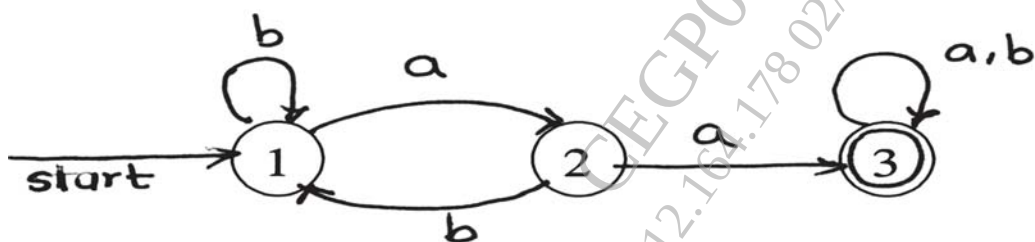
OR

- Q4)** a) Explain the representation of TM. [4]
 b) Construct TM for 1's complement of binary number. [6]
 c) Design a Turing Machine to accept the language [8]
 $L = \{w / w \in (0+1)^*\}$ containing the substring 001.

- Q5)** a) Define PDA. What are different types of PDA? [4]
 b) Design a PDA that accepts $\{a^n b^n \mid n \geq 0\}$ [6]
 c) Construct a PDA that accepts all palindrome strings over [6]
 $\Sigma = \{a, b\}$. Specify simulation for string 'aba'.

OR

- Q6)** a) Explain the working of Top-Down parser with example. [4]
 b) Construct a PDA that recognizes the language accepted by following DFA. [6]



- c) Construct a NPDA that accepts the language $L = \{a^n \mid n > 0\}$ [6]

OR

- Q7)** a) What do you mean by NP- problems? Justify that Travelling Salesman problem is NP problem. [8]
- b) Explain the vertex cover problem in the context of polynomial time reduction. Justify with suitable example. [8]

OR

- Q8)** a) Write short notes on [8]
- i) Undecidability
- ii) Post Correspondence Problem
- b) What is Universal Turing Machine? Comment on stored program concept with reference to the same. [8]

