

Total No. of Questions : 8]

SEAT No. :

P3381

[Total No. of Pages : 3

[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

$S \rightarrow AB$   $I \in$

$A \rightarrow a$

$B \rightarrow b$

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]  
 $L = \{0^n 1^n, n \geq 1\}$ .

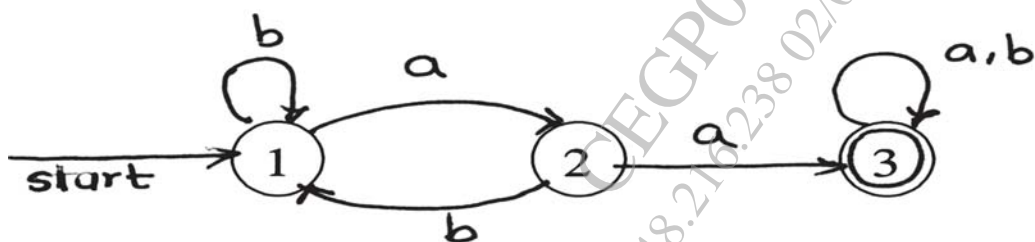
OR

- 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  $\{a^n b^n | n \geq 0\}$  [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 [6]  
 DFA.



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

