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 Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Construct DFA for language defined by Σ= {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-> AB I ∈

A->a

B ->b

Convert G in CNF.

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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]**

$L=\{0^n1^n.n \geq 1\}$.

OR

Q4) a) Explain the representation of TM. **[4]**

b) Construct TM for l'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]**

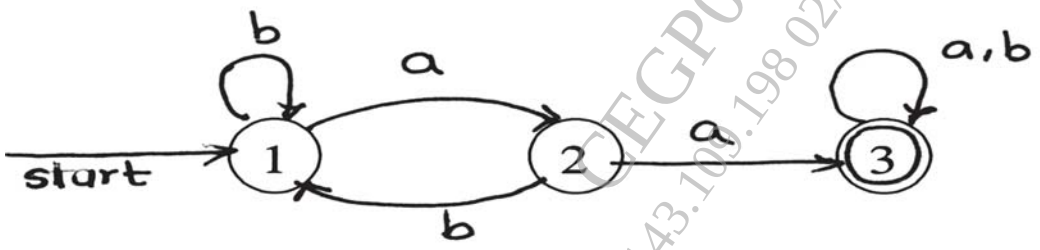
c) Construct a PDA that accepts all palindrome strings over **[6]**

$\Sigma = \{a, b\}$. 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 DFA. **[6]**



c) Construct a NPDA that accepts the language $L = \{a^{2n} | n > 0\}$ **[6]**

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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]**

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