Total No. of Questions : 5]

SEAT No. :

P5154

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T.Y. B.Sc.

COMPUTER SCIENCE

CS - 356 : Theoretical Computer Science

(2019 Pattern) (CBCS) (Semester - V)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any EIGHT of the following (Out of TEN) : **[8 × 1 = 8]**

a) If A = { $\in$} Find the value of |A|.

b) List all the proper suffixes of the string "0123".

c) Define Useless symbol.

d) Give formal definition of Turning Machine.

e) Define left linear grammar.

f) State True or False. DFA do not have multiple final states.

g) Name the type of language accepted by Pushdown Automata.

h) Write the tuples of LBA.

i) State true or false. Pumping lemma is used to show that language is not context tree.

j) Write smallest possible string accepted by the following regular expression.

a(a+b)*ab

Q2) Attempt any FOUR of the following (Out of FIVE) : **[4 × 2 = 8]**

a) Explain types of grammar.

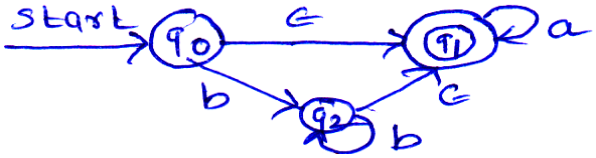
b) Construct FA for regular expression.

(1+0)*0

c) Differentiate between CNF and GNF (any two points).

P.T.O.

d) Write down the ∈-closure of each state from the following FA.



e) Define types of Turing Machine.

Q3) Attempt any TWO of the following (Out of THREE) : **[2 × 4 = 8]**

a) Construct a DFA for a language

L1∩L2

L1={All strings starting with 'a'}

L2={All strings not having 'ab' as substring}

b) Construct the following CFG intNormal Form (CNF)

S–>aSa | bSb

S–>a |b| aa | bb

c) Design TM for language,

$L=\{WCW^R|W \text{ is in } (0+1)^*\}$

Q4) Attempt any TWO of the following (Out of THREE) : **[2 × 4 = 8]**

a) Construct a PDA for the language

$L=\{a^n b^n c^n \mid n>=0\}$.

b) Construct a Moore machine for the language L over ∑ = {0,1} which outputs '*' if the string contains '11' in it and outputs '#' otherwise.

c) Compare DFA and NFA.

Q5) Attempt any ONE of the following (Out of TWO) : **[1 × 3 = 3]**

a) Construct a Mealy machine over alphabet {0, 1} which toggles its input.

b) Show that $L=\{0^n1^n \mid n>=1\}$ is not regular.

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