

Total No. of Questions : 5]

SEAT No. :

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T.Y.B.Sc.

COMPUTER SCIENCE

CS-356 : Theoretical Computer Science

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

Time : 2 Hours

[Max. Marks : 35

Instructions to the candidates:

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

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

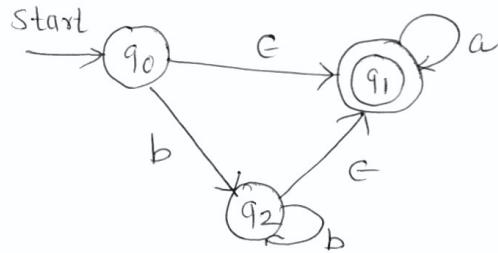
- a) Give the meaning of ‘ δ ’ function of NFA
- b) State pumping lemma of regular set.
- c) Define suffix of a string. Give one example.
- d) If $A=\{\epsilon\}$. Find the value of A.
- e) Define context sensitive grammar.
- f) Compare ‘ λ ’ function of Melay and Moore Machine.
- g) Name the type of language accepted by Pushdown Automata.
- h) “PDA is more powerful than FA”. Justify.
- i) Define tuples of turing Machine.
- j) State two differences between NFA and DFA.

Q2) Attempt any four of the following (Out of Five) [4×2=8]

- a) Explain types of Regular grammar.
- b) Construct NFA for regular expression. $(1^*+0)^*$
- c) Differentiate between Moore and Mealy machine.

P.T.O.

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



e) Write a regular expression for language contains set of all strings of a's and b's ending in bb..

Q3) Attempt any two of the following (Out of Three) [2×4=8]

- Construct a NFA for a language to accept strings which contains substring 'abbc' over the set of alphabets {a,b,c}
- Convert the following CFG into Chomsky Normal Form (CNF)

S->ABA

A->aA| \in

B->bB| \in

- Design TM for language which accept regular language a^*b^*

Q4) Attempt any Two of the following (out of Three) [2×4=8]

- Construct a PDA for the language
 $L=\{WW^R | W \text{ is in } (a+b)^*\}$
- Construct a Moore machine to generate 1's complement of binary number.
- Write short note on Chomsky hierarchy.

Q5) Attempt any One of the following (Out of Two) [1×3=3]

- Construct a Mealy machine to convert each occurrence of substring 101 by 100 over alphabet {0,1}
- Show that $L = \{0^n 1^n | n \geq 1\}$ is not regular.

