

Total No. of Questions : 5]

SEAT No. :

**PB1888**

[Total No. of Pages : 2

**[6237]-506**

**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.

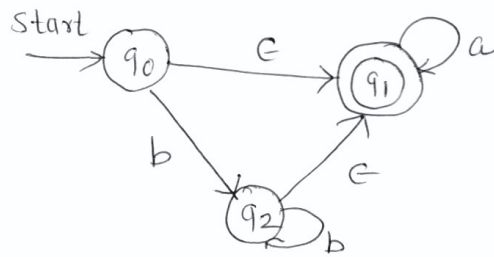
**Q2)** Attempt any four of the following (Out of Five)

**[4×2=8]**

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

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- d) Write down the  $\epsilon$ -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)  
 $S \rightarrow ABA$   
 $A \rightarrow aA | \epsilon$   
 $B \rightarrow bB | \epsilon$
- 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.

