Total No. of Questions : 5]

SEAT No. :

PD1576

[Total No. of Pages : 2

[6468]-56

T.Y. B.Sc. (Computer Science)

CS - 356 : THEORETICAL COMPUTER SCIENCE

(Revised 2019 Pattern) (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) Write the smallest possible string accepted by regular expression. ab(a+b)ab*.

b) Satet true or false: Pumping lemma is used to show that language is not regular.

c) Define ambiguous grammar.

d) Define GNF?

e) State any two operations on languages.

f) Find nullable symbols in the following CFG.

$S \rightarrow AB \mid aBb$

$A \rightarrow aA \mid \varepsilon$

$B \rightarrow AD \mid aAb$

$D \rightarrow bD \mid \varepsilon$

g) Give diagrammatic representation of TM.

h) Write RE for the set A = {ab, aabb, aaabbb....}

i) Describe in English the set accepted by the following FA.

j) DFA cannot have more than one final state. State True or False.

P.T.O.

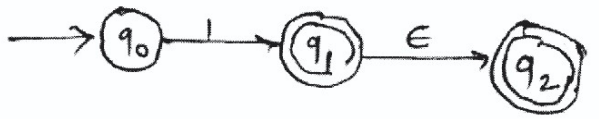
Q2) Attempt any Four of the following (out of Five) : **[4×2=8]**

a) Name the types of languages accepted by PDA.

b) What is Unit Production?

c) Construct FA for regular expression 1.0* + 0*.1.

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



e) State two differences between Melay and Moore Machine.

Q3) Attempt any Two of the following (out of Three) : **[2×4=8]**

a) Construct DFA to accept strings having substring 'aba' in it over $\Sigma = \{a, b\}$.

b) Convert the following CFG into GNF

$S \rightarrow aAS|a$

$A \rightarrow SbA|SS|bA$

c) Design TM for language

$L = \{a^n b^n a^n | n \geq 1\}$

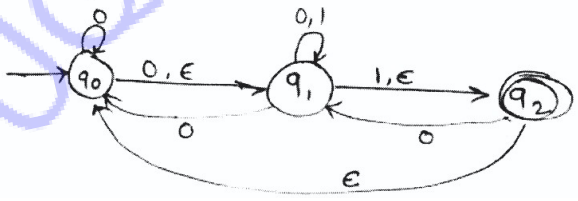
Q4) Attempt any Two of the following (out of Three) : **[2×4=8]**

a) Construct a PDA for the language

$L = \{a^n b^{2n+1} | n \geq 1\}$

b) Construct Melay machine to convert each occurrence of substring 101 by 100 over $\Sigma = \{0,1\}$.

c) Construct equivalent DFA for the following NFA.



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

a) Define Regular Grammar. Explain its types.

b) Construct CFG for : $\{a^n b^n c^i | n \geq i,\ i \geq 0\}$.