Total No. of Questions : 5]

SEAT No. :

P-6395

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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) Write the smallest possible string accepted by regular expression. 01 (0 + 1) 01*.

b) State True or False. PDA accepts only non-regular sets.

c) Define ambiguous grammar.

d) What are the types of grammar in Chomsky hierarchy?

e) What is Reduction?

f) State True or False. String consists of only Non-Terminal symbol.

g) Define non-deterministic Turing machine.

h) If A = {∈} find the value of | A |.

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

j) State two differences between NFA and DFA.

P.T.O.

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

a) Explain two methods for defining language. Accepted by PDA.

b) Explain types of regular grammar.

c) Construct FA for regular expression ((1+0)* + 100)*.

d) Differentiate between Moore and Melay Machine.

e) State two differences between TM and LBA.

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

a) Construct DFA for language which contains all string with exactly 2 consecutive 1's any where.

b) Convert the following CFG into CNF

$S \rightarrow XYX$

$X \rightarrow aX/\in$

$Y \rightarrow bY/\in$

c) Design TM for language

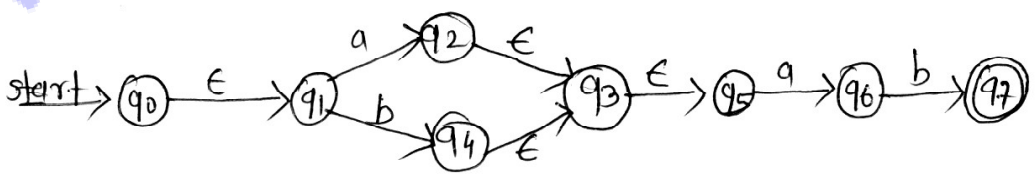
$L = \{a^m\ b^n\ /\ n \geq m$ and $m \geq 1\}$

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

a) Construct a PDA for the language $\{w / na(w) = nb(w)\}$ number of a's is equal to number of b's.

b) Construct Moore machine which outputs even or odd according to number of a's encounted is even or odd.

c) Construct equivalent DFA for the following NFA.



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

a) Show that L = $\{O^n 1^n O^n\}$ is not regular.

b) Eliminate $\in$-production for grammar & also find nullable variable.

$S \rightarrow AB$

$A \rightarrow SA/BB/bB$

$B \rightarrow b/aA/\in$

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