Total No. of Questions :10]

SEAT No. :

P3635

[Total No. of Pages : 3

[5560]-591
T.E. (I. T.)
THEORY OF COMPUTATION
(Semester-I) (314441) (2015 Pattern)

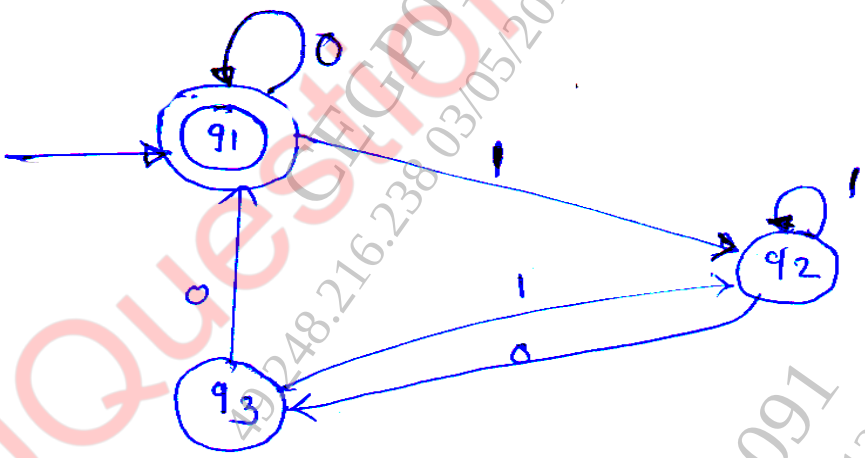
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Design FA that rear string made up of letters in the word 'CHARIOT' and accept those string that contain 'CAT' as a substring. **[5]**

b) Find out the regular Expression from given transition diagram (FA) by using Arden's theorem. **[5]**



OR

Q2) a) Show that $L = \{0^i 1^i \mid i \geq 1\}$ is not regular, by using pumping lemma. **[6]**

b) Define - (i) Language- **[4]**

With an

Example- (ii) Regular Expression

P.T.O.

Q3) a) Find out the CFG From given language " L cantains the strings consisting of a's and b's with at least two a's". **[2]**

b) Find the CFL associated with given CFG. **[3]**

$S \rightarrow a\,A\,/1/B$

$A \rightarrow 1B\,/1$

$B \rightarrow 0A/0$

b) Convert the following grammar into (CFF). **[5]**

$S \rightarrow ABA$

$A \rightarrow a\,A/\in$

$B \rightarrow b\,B/\in$

OR

Q4) a) Write a short Note on Chansky Hierarch with an example. **[4]**

b) Check whether the following grammar is ambiguous or Not, if it is ambiguous, remove the ambiguity & write an equivalent ambiguous grammar. **[6]**

$S \rightarrow i\,C\,t\,s\,/\,i\,C\,t\,s\,C\,S$

$C \rightarrow b,\ S \rightarrow a$

Q5) a) Construct PDA for following language. **[8]**

$L = \{\ 0^n 1^m\ 2^n \mid n, m >= 0\}$

b) Design post machine for language. **[8]**

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

OR

Q6) a) Obtain PDA for given grammar **[10]**

$S \rightarrow a\,ABC$

$A \rightarrow aB|a$

$B \rightarrow bA|b$

$C \rightarrow a$

Design PDA for following language.

b) $L = \{\ a^n\ b^n\ c^m\ d^m \mid n, m >= 1\}$ **[6]**

Q7) a) Design a TM that multiplies two unary. **[10]**

numbers over $\Sigma = \{ a \}$

Write simulation for (i) aa & aaa

(ii) aaa & aaa

b) Explain the halting problem in TM. **[8]**

OR

Q8) a) Construct TM for the language. **[10]**

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

show simulation for (i) aabbcc (ii) abbccc

b) Compare FM , PDA, PM, & TM with respect to language grammar , powerfulness and example. **[8]**

Q9) a) Prove that following are decidable languages. **[10]**

i) ACFG= { (G, W) | The context sensitive grammar G accepts the input string W}.

ii) ADFA = { (B, W) | B accepts the input string W}

b) Prove that pcp with two lists x = (01, 1, 1)

$y = (01^2, 10, 1^1)$ has no solution. **[6]**

OR

Q10) a) Show that $HALT_{TM}$ ={ (M, W) | The turing Machine M holts on input W} is undecidable. **[8]**

b) Prove that " It is undecidable whether a CFG is ambiguous". **[8]**