

Total No. of Questions :10]

SEAT No. :

P3635

[5560]-591

[Total No. of Pages : 3

T.E. (I. T.)

THEORY OF COMPUTATION
(Semester-I) (314441) (2015 Pattern)

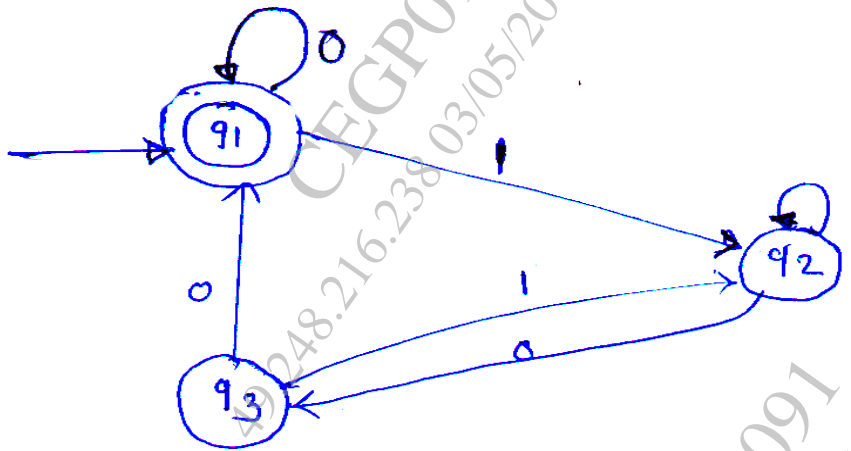
Time : 2½ Hours]

[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 $L = \{0^i1^i \mid i \geq 1\}$ 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 contains 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]

$$S \rightarrow ABA$$

$$A \rightarrow a A/\epsilon$$

$$B \rightarrow b B/\epsilon$$

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]

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

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

Q7) a) Design a TM that multiplies two unary numbers over $\Sigma = \{ a \}$ [10]

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) $ACFG = \{ (G, W) \mid \text{The context sensitive grammar } G \text{ accepts the input string } W \}$.

ii) $ADFA = \{ (B, W) \mid B \text{ accepts the input string } W \}$

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

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

OR

Q10) a) Show that $HALT_{TM} = \{ (M, W) \mid \text{The turing Machine } M \text{ halts on input } W \}$ is undecidable. [8]

b) Prove that “It is undecidable whether a CFG is ambiguous”. [8]

