

Total No. of Questions : 10]

SEAT No. :

P2910

[4958]-1105

[Total No. of Pages : 3

T.E. (IT)

THEORY OF COMPUTATION

(2012 Pattern) (End Semester) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

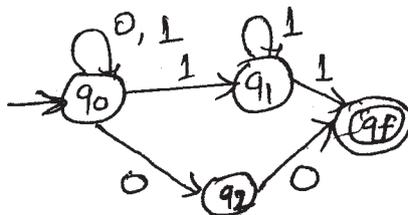
Q1) a) Define the following terms

[4]

- i) Strings
- ii) Language
- iii) Alphabets
- iv) Kleen closure

b) Obtain a DFA equivalent to the NFA.

[6]



OR

Q2) a) Explain the Basic Finite Automata? What are the various application & limitation of it? [4]

b) Describe in the simple english the language defined by the following RE

- i) $(a+b)^* a(a+b)^*$
- ii) $(01^*0)^* 1$
- iii) $a(a+b)^* bb$

[6]

P.T.O.

Q3) a) Obtain regular expression to the following regular grammar [4]

$$S \rightarrow aA/bB$$

$$A \rightarrow bA/a$$

$$B \rightarrow aB/b$$

b) Simplify given grammar [6]

$$S \rightarrow AaA$$

$$A \rightarrow Sb/bcc/\epsilon$$

$$C \rightarrow cc/abb$$

OR

Q4) a) Define ambiguous Grammar. Show given Grammar is ambiguous or not. [4]

$$S \rightarrow aSbS/bSaS/\epsilon$$

b) Construct a FA for given regular expression $(10)^* 101(01)^*$ [4]

c) Define derivation tree with suitable example. [2]

Q5) a) Give formal Definition of Push Down automata & applications of PDA. [4]

b) Construct a PDA accepting $L = \{w \subset w^R \mid w \text{ is in } (a/b)^* \text{ and } w^R \text{ is reverse of } w\}$ [8]

c) Prove that the Language $L = \{ww \mid w \text{ is in } (0+1)^*\}$ is not a CFL. [6]

OR

Q6) a) Give the CFG generating the Language accepted by the following PDA. [8]

$M = (\{q_0, q_1\}, \{0, 1\}, \{z_0, x\}, \delta, q_0, z_0, \phi)$ where δ is given below

$$\delta(q_0, 1, z_0) = \{(q_0, xz_0)\}$$

$$\delta(q_0, 1, x) = \{(q_0, xx)\}$$

$$\delta(q_0, 0, x) = \{(q_1, x)\}$$

$$\delta(q_0, \epsilon, z_0) = \{(q_0, \epsilon)\}$$

$$\delta(q_1, 1, x) = \{(q_1, \epsilon)\}$$

$$\delta(q_1, 0, z_0) = \{(q_0, z_0)\}$$

b) Write short note on post machine with example. [6]

c) Construct a PDA equivalent to following grammar [4]

$$S \rightarrow aAA$$

$$A \rightarrow aS/bS/a$$

- Q7)** a) Construct a Turing machine to perform mod2 operation on given binary number retain original number as well as store result after number separated by blank. [8]
- b) Differentiate between FA, PDA, and TM. [4]
- c) Write short note on multitape turing machine. [4]

OR

- Q8)** a) Construct a Turing machine to perform the two's complement of given binary number. [8]
- b) Write short note on universal Turing machine. [8]
- Q9)** a) Write short note on post correspondence problem (PCP). [4]
- b) Explain with example decidable & non decidable language. [6]
- c) Explain with example Turing Reduceability. [6]

OR

- Q10)**a) Show that following decision problems are recursive. [10]
- i) NFA accepts a word or not
- ii) CEG G generates the string w or not.
- b) Write short note on recursive language & recursively enumerable language with suitable example. [6]

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