

Correction in **Theoretical Computer Science**

Q.P. Code: **10083672**

Consider Following corrections in QP Code 83672 (TE Comp SEM VI TCS subject)

**Q2 b.** Please read 'i' instead of 'l' in the production rule set provided.

Correct production rules are:

$S \rightarrow iCtS \mid iCtSeS \mid a, C \rightarrow b$

Rest of the question is as it is.

**Q3 b.**

- ii. Read Regular expression as  
 $01((01)^*+111^*+0)^*1$



TE (comp.) Sem (V) R-19 C-scheme 03/06/25.

(3 hours)



[80 marks]

NOTE:

1. Question No 1 is compulsory
2. Attempt any three questions from remaining.
3. Assume suitable data if necessary and state the same.

Q1.

[20]

- a) Difference between NFA & DFA
- b) Design a Moore machine for binary adder. Clearly list all components that make up the machine.
- c) Construct the right linear grammar corresponding to regular expression  $R = (0+1)1^*(1+(01)^*)$
- d) Explain Pumping Lemma for CFG.

Q2.

- a) Construct PDA accepting the language  $L = \{a^{2n}b^n \mid n \geq 0\}$

[10]

- b) Consider the following grammar:  $S \rightarrow ICtS \mid ICtSeS \mid a, C \rightarrow b$

[10]

For the string 'ibtibtaea' find the following:

- i) Is this a CFG? Explain your answer.
- ii) Leftmost derivation
- iii) Rightmost derivation
- iv) Parse tree for both of above
- v) Check if the above grammar is ambiguous.

Q3.

- a) Construct a DFA accepting a language generated by the left linear grammar given below

$$S \rightarrow Ca \mid Bb, C \rightarrow Bb, B \rightarrow Ba \mid b$$

[10]

- b) Construct the finite automata equivalent to the following regular sets

$$i) 10+(0+11)0^*1$$

$$ii) 01[(10)^*+111)^*+0]^*1$$

[10]

Q4.

- a) Design a TM to add two unary numbers

[10]

- b) Design a finite automata with output to check divisibility by 3 to binary number.

[10]

Q5.

- a) Write a short note on Pumping Lemma for regular language. Prove  $L = \{a^{2n}b^{3n} \mid n > 0\}$

is not a regular language using pumping lemma.

[10]

- b) Construct PDA accepting the language  $L = \{a^{2n}b^n \mid n > 0\}$

[10]

Q6.

- a) Explain Chomsky hierarchy

[10]

- b) Write a detail note on halting problem

[10]

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Program Code:-

1T00735.