

Total No. of Questions : 8]

SEAT No. :

P-7617

[Total No. of Pages : 2

[6180]-137

T.E. (Information Technology)
THEORY OF COMPUTATION
(2019 Pattern) (Semester-I) (314441)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

Q1) a) Define context free grammar. Write down CFG for the following regular expression. [6]

$(0+1)0^*(1+(01)^*)$

- b) Write a note on Chomsky hierarchy. [6]
- c) What is an ambiguous grammar? Explain with a suitable example. [6]

OR

Q2) a) What are left linear and right linear regular grammars? Explain the process of converting a Left Linear Regular Grammar to Right Linear Regular Grammar with an example. [7]

- b) Construct a CNF for the following grammar. [6]

$S \rightarrow aAbB$

$A \rightarrow aA|a$

$B \rightarrow bB|b$

- c) Check whether the given language is CFL or not $L = \{a^n b^n c^n | n \geq 0\}$ [5]

Q3) a) Construct a PDA equivalent to the following CFG. [8]

$S \rightarrow 0BB$

$B \rightarrow 0S \mid 1S \mid 0$

Test if 010^4 is in language.

- b) Compare Finite Automata and Push Down Automata. [4]
- c) Write a note on Post machine. [5]

OR

P.T.O.

- Q4)** a) Find the transition rules of PDA for accepting a language $L = \{w \in \{a,b\}^* \mid w \text{ is of } a^n b^n \text{ with } n \geq 1\}$ through both empty stack and final state and demonstrates the stack operation for the string "aaabbb". [9]
- b) Design a Post machine for the language $L = \{a^n b^n c^n\}$. [8]

- Q5)** a) Design a Turing machine to subtract two unary numbers. [6]
- b) Explain Halting Problem of turing machine. [6]
- c) Write a note on Universal turing Machine. [6]

OR

- Q6)** a) Design a Turing machine to accept language $L = \{0^n 1^n 2^n \mid n > 0\}$. Draw transition graph and write down transition table. [9]
- b) Explain the concept of Post Correspondence Problem with an example. [5]
- c) Differentiate between Finite Automata and Turing Machine. [4]

- Q7)** a) Explain in detail Decidable problems concerning regular languages, and Decidable problems concerning context free languages. [7]
- b) Explain Traveling Salesperson Problem and Justify whether the Traveling Salesperson Problem is a class P or class NP problem. [6]
- c) What are recursive and recursively enumerable languages? [4]

OR

- Q8)** a) Explain Cook's theorem in detail. [8]
- b) Explain Satisfiability Problem and comment on NP Completeness of the SAT Problem. [9]

