

B.Sc.-III (Information Technology) (CBCS Pattern) Semester - V
002 - Paper-I (Elective-II) : Theory of Computational Analyzer

P. Pages : 2

Time : Three Hours



GUG/S/23/13129

Max. Marks : 40

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- Notes :
1. All questions are compulsory and carry equal marks.
 2. Draw neat and labelled diagrams wherever necessary.
 3. Avoid vague answers and write answers relevant and specific to questions only.

Either :

1. a) Draw block diagram of Finite Automation. Explain each unit in detail. 4
- b) Construct DFA for the set of all strings containing at least two consecutive zeros anywhere in the string over $\Sigma = \{0,1\}$. 4

OR

- c) Write a note on Deterministic Finite Automation and Non-Deterministic Finite Automation with ϵ moves. 4
- d) Construct NFA for $R = (0+1)^*01$. 4

Either :

2. a) What is Ambiguous Grammar? Explain with suitable example. 4
- b) Prove that $L = \{a^p \mid p \text{ is prime}\}$ is not regular. 4

OR

- c) What is the use of Pumping Lemma? Give the application of Pumping Lemma for Regular Sets. 4
- d) Let G be the grammar whose productions are 4
 $S \rightarrow aAS \mid a$
 $A \rightarrow SbA \mid SS \mid ba$
For the string "aabbaa"
Find
1) Leftmost Derivation.
2) Rightmost Derivation.
3) Parse Tree.

Either :

3. a) Draw block diagram of PDA and Explain each unit in detail. 4
- b) Design a PDA for accepting a language $L = \{0^n1^n \mid n \geq 1\}$. 4

OR

- c) Write a note on 4
i) Multi Tape Turing Machine.
ii) Multi Head Turing Machine.

- d) Prove that $L = \{a^i b^j \mid j = i^2\}$ is not a CFL. 4

Either :

4. a) Define Compiler. Explain structure of Compiler in detail. 4

- b) What is Parse Tree? Explain the steps to draw a Parse Tree in detail. 4

OR

- c) Explain Syntax Analysis i.e. Parser in detail. 4

- d) What is the main function of Code optimization? Explain with suitable example. 4

5. Attempt all the questions.

- a) Write a short note on Two Way Deterministic Finite Automation. 2

- b) Define Context Free Grammar. 2

- c) Give the formal definition of Turing Machine. 2

- d) What is the need of Translator? 2
