	Hall Ticket No	le: AITB03
INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)		
	B.Tech IV Semester End Examinations (Regular), November – 2020 Regulation: IARE–R18 THEORY OF COMPUTATION	
Tir	me: 2 Hours (CSE IT) Max	Marks: 70
Answer any Four Questions from Part A Answer any Five Questions from Part B		
$\mathbf{PART} - \mathbf{A}$		
1. Differentiate NFA and DFA. [5M]		
2.	State the applications of regular expressions.	[5M]
3.	With illustrations, explain i) Derivation ii) Derivation/Parse tree and iii) Subtree	[5M]
4.	Write about CFG with an example.	[5M]
5.	Explain turing machine with an example.	[5M]
6.	Explain the different forms of PDA with examples.	[5M]
7.	Convert regular expression $01^* + 1$ to finite automata.	[5M]
8.	State the definition of Pushdown automata.	[5M]
$\mathbf{PART} - \mathbf{B}$		
9.	State the components of finite automaton model. Also list the applications of automata theory.	[10M]
10.	Give the state diagram of a DFA that accepts only binary strings which represent numbers divisib For example, it accepts 0, 11, 110 but it rejects the empty string, 1, 101, 0111.	le by three. [10M]

- 11. Prove that the set of strings over the alphabet $\{0\}$ of the form 0^n where n is a prime is not regular. [10M]
- 12. Construct the finite automata (NFA- ϵ) for given regular expression (0+1)*00(0+1)*. [10M]
- 13. Convert the following CFG to equivalent Chomsky normal form

$$\begin{split} \mathbf{S} &\rightarrow \mathbf{AACD} \mid \mathbf{ACD} \mid \mathbf{AAC} \mid \mathbf{CD} \mid \mathbf{AC} \mid \mathbf{C} \\ \mathbf{A} &\rightarrow \mathbf{aAb} \mid \mathbf{ab} \\ \mathbf{C} &\rightarrow \mathbf{aC} \mid \mathbf{a} \\ \mathbf{D} &\rightarrow \mathbf{aDa} \mid \mathbf{bDb} \mid \mathbf{aa} \mid \mathbf{bb} \end{split} \tag{10M}$$
14. Create the minimization of CFG - $\begin{aligned} \mathbf{S} &\rightarrow \mathbf{AbA} \\ \mathbf{A} &\rightarrow \mathbf{Aa} / \epsilon. \end{aligned} \tag{10M}$ 15. Express PDA mathematically. With a neat diagram explain the working of a PDA with example. [10M]

- 16. Construct the PDA for the following language. $L = \{w | w \text{ of form } a^n b^n\}.$ [10M]
- 17. Illustrate the techniques for Turing machine construction. Show that the collection of all turing machines is countable. Explain all types of turing machines.

[10M]

18. Draw a transition diagram for a Turing Machine accepting the following language $\{a^n b^n c^n \mid n \ge 0\}$. [10M]