(Please write your Roll No. Immediately) Roll No:

B. Tech. Mid-Term Examination

February 2020

Semester 4th
Paper Code: ETCS 206 **Subject: Theory of Computation**

Time: 1.5 hours Max Marks: 30

Note: -- Q. No. 1 is compulsory and attempt any two more questions.

Q. 1(a) Explain Mealy Machine and Moore Machine with example. **(2)**

(b) Explain Chomsky Classification of Languages. **(2)**

(c) Convert the grammar

$S \longrightarrow abaSa \mid aba$ in Greibach Normal Form (CNF). **(2)**

(d) Show that the grammar

$S \longrightarrow aS \mid Sa \mid a$ is ambiguous. **(2)**

(e) Write the regular expression for the language

$L = \{a^n b^n : (n+m) \text{ is even}\}$ **(2)**

Q. 2(a) Construct a Mealy Machine which calculates residue mod-4 for each binary string treated as binary integer. **(5)**

Q. 2(b) Design a Finite Automata that strings made up of the letters in the word 'C H A R I O T' and recognizes those strings that contain the word 'CAT' as a substring. **(5)**

Q. 3(a) Use pumping lemma to prove that the language

$L = \{0^2, 0^3, 0^5, \_ \_ \_\}$ is not regular **(5)**

Q. 3(b) Find the reduced grammar for given below Context Free Grammar (CFG)

$A \longrightarrow xyz \mid Xyzz$

$X \longrightarrow Xz \mid xYz$

$Y \longrightarrow yYy \mid Xz$

$Z \longrightarrow Zy \mid z$ **(5)**

Q. 4 Design a Push Down Automata (PDA), which accepts the following language $L = \{ a^n b^n \mid n \geq 0\}$ **(10)**

OR

Q. 4 Construct equivalent Deterministic Finite Automata (DFA) for given below Non-Deterministic Finite Automata (NFA) **(10)**

$M = [\{q_0, q_1\}, \{0, 1\}, \delta, q_0, \{q_1\}]$ where δ is state transition function given as:

Q	0	1
q_0	$\{q_0, q_1\}$	q_1
q_1	$\emptyset$	$\{q_0, q_1\}$