

Slot : A1+TA1+TAA1 and A2+TA2+TAA2

School of Information Technology and Engineering

Fall Semester 2023-2024 (2021 B.Tech Students)

Continuous Assessment Test – II

Programme Name & Branch: B.Tech IT

Course Name & code: BITE306L, Theory of Computation

Class Number (s): VL2023240100142/0144/0150/0139/0141/0151/0143/0145/0140

Faculty Name (s): Prof. Pradeepa M/ Prof. Ramya G / Prof. Chandrasegar T / Prof. Mohanraj G/
Prof. Nagalakshmi Vallabhaneni

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s):

Answer all the questions

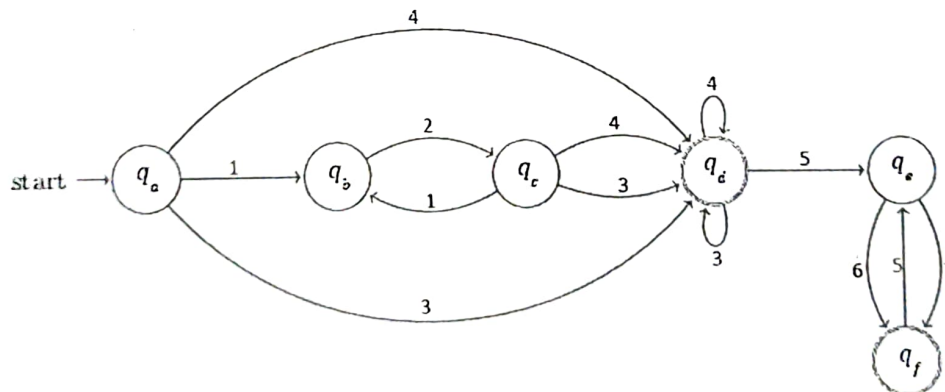
10*5=50 Marks

1. Construct the pushdown automata that recognize the language,
 $L = \{a^{2m}c^{4n}d^n d^m, \text{ where } n, m \geq 0\}$

Note: Push one input alphabet at a time: similarly, pop one alphabet from top of the stack at a time.

2. Convert the given DFA into Regular Expression using Arden's (or) State Elimination Method.

Note: Here the q_d and q_f are the final states.



3. Evaluate the following grammars G_1 and G_2 may or may not be ambiguous. If it is ambiguous, indicate the grammar by constructing two or more parse trees with the shortest string.

2,3,4

$G_1: S \rightarrow AB \mid aaB$

$A \rightarrow aA \mid \epsilon$

$B \rightarrow bB \mid b$

$G_2: S \rightarrow aAb \mid abB$

$A \rightarrow ab$

$B \rightarrow \epsilon$

④

Evaluate the following grammars: G_3 and G_4 may or may not be finite or infinite. Let G be the grammar defined by (V, T, P, S) . Also check if the grammar is regular or CFG and justify it with appropriate reasons. Also present the intermediate results in the Table I.

$G_3: S \rightarrow AB \mid aaB$

$A \rightarrow aA \mid \epsilon$

$B \rightarrow bB \mid \epsilon$

$G_4: S \rightarrow A \mid B$

$A \rightarrow aAb \mid ab$

$B \rightarrow abB \mid \epsilon$

regular language
Format $\Rightarrow$

$A \rightarrow \omega B / B \omega$

$A \rightarrow \omega$

$A \rightarrow \epsilon$

$\omega \in \text{terminal}$
 $A, B \in \text{NT}$.

5.

Construct an equivalent CNF grammar G from the following CFG. Let G_5 be the grammar defined by (V, T, P, S) . Also specify the intermediate results in the following Table II.

$G_5: S \rightarrow AS \mid ABA \mid CD$

$A \rightarrow aB$

$B \rightarrow Bb \mid \epsilon$

$C \rightarrow aCb \mid Cb$

$D \rightarrow aBa \mid d$

$E \rightarrow DE \mid e$

Since we are able to derive parse tree of ∞ length for both $\therefore$ infinite.

Table I

Grammars:	Finite or Infinite	Regular or CFG
G_3		
G_4		

Else it is
CFG

Table II

G_5	Production's
Null production	1
Unit Production	0
Useless symbols and variables	1
Final CNF's total production	11