

Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)

Department of Computer Science & Engineering(AI&ML) and CSE (Cyber Security)

Programme: B.E

Date: 08-01-2025

Course: Automata Theory and Compiler Design

Course Code: CI53/CY53

CIE: I (RETEST)

Sem: V

Max Marks: 30

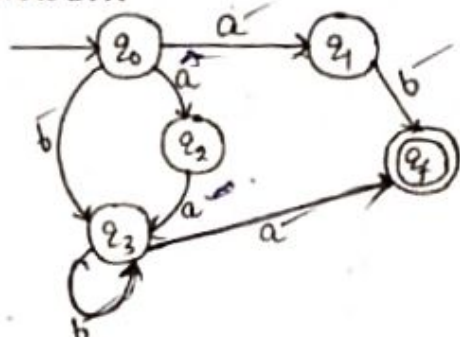
Time: 1 Hr

Portions for Test: L1-L42

Instructions to Candidates:

1. Answer two full questions. Each Question carries 15M.
2. Mobiles, smart watches or any electronic gadgets are strictly banned.

Sl#	Question	Marks	Bloom's Level	CO Mapping
1	a. Illustrate postfix SDT's. Write the rules for turning an L-attributed SDD into an SDT.	4	Apply	CO3
	b. Answer the following with proper justification i. Consider the SDTS below $E \rightarrow E \text{ out } (*2)$ $E \rightarrow E + T \text{ out } ('1')$ $E \rightarrow T \text{ out } ('10*')$ $T \rightarrow T * F \text{ out } ("')$ $T \rightarrow F \text{ out } ('100+')$ $F \rightarrow \text{num out}(\text{num val})$ The input is $1 + 1 * 1$ and the output generated is evaluated as an arithmetic expression. The value obtained is _____. ii. Which one of the following is True at any valid state in shift-reduce parsing? (A) Viable prefixes appear only at the bottom of the stack and not inside (B) Viable prefixes appear only at the top of the stack and not inside (C) The stack contains only a set of viable prefixes (D) The stack never contains viable prefixes iii. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a, b}. $S \rightarrow aA \quad \{ \text{print } 1 \}$ $S \rightarrow a \quad \{ \text{print } 2 \}$ $A \rightarrow Sb \quad \{ \text{print } 3 \}$ Using the above SDT, the output printed by a bottom-up parser, for the input aab is (A) 1 3 2 (B) 2 2 3 (C) 2 3 1 (D) Syntax Error iv. What is the maximum number of reduce moves that can be taken by a bottom-up parser for a grammar with no epsilon and unit-production (i.e., of type $A \rightarrow \epsilon$ and $A \rightarrow a$) to parse a string with n tokens? (A) $n/2$ (B) $n-1$ (C) $2n-1$ (D) $2n$	6 (with explanation)	Analyze	CO3
	c. Construct the LALR (1) set of items for the following Grammar G:- $A \rightarrow BB$ $B \rightarrow \{ B$ $B \rightarrow \}$	5	Apply	CO2
2	Construct a DFA that accepts a language L over input alphabets $\Sigma = \{a, b\}$ such that L is the set of all strings starting with 'aa' or 'bb'.	4	Understand	CO3

<p>b. Consider the grammar G:- $S \rightarrow a T R e$ $T \rightarrow T b c$ $T \rightarrow b$ $R \rightarrow d$</p> <p>i) Construct the LR (0) set of items by indicating the Kernel and Non-kernel items for each item set. ii) Construct LR(0) parsing table iii) Show the actions of a parser on input "abde"</p>	6	App ly	CO2														
<p>Convert the GIVEN NFA to DFA</p>  <p style="text-align: center;">FIG 2c. NFA</p>	5	App ly	CO2														
<p>3 Which of the following describes a handle appropriately?</p> <p>(A) It is the position in a sentential form where the next shift or reduce operation will occur. (B) It is non-terminal whose production will be used for reduction in the next step. (C) It is a production that may be used for reduction in a future step along with a position in the sentential form where the next shift or reduce operation will occur. (D) It is the production p that will be used for reduction in the next step along with a position in the sentential form where the right hand side of the production may be found.</p> <p>Identify the handles for the given inputs string "abbcd" by showing the moves made by a shift reduce parser. G:- $S \rightarrow aABe$ $A \rightarrow Abc \mid b$ $B \rightarrow d$</p>	1+3 =4	Re me mbe r, Ana lyze	CO2														
<p>b. Describe about the side effects involved in the translation of semantic rules. Indicate the possible ways to control the side effects. Identify the side effects involved in the given translation</p> <table border="1" data-bbox="521 1500 914 1859"> <thead> <tr> <th>Input</th> <th>Translation</th> </tr> </thead> <tbody> <tr> <td>9 + 5 + 2</td> <td>$S \rightarrow T R$</td> </tr> <tr> <td>9 + 5 + 2</td> <td>$T \rightarrow \text{num} \{ \text{print}(\text{num.val}); \}$</td> </tr> <tr> <td>+ 5 + 2</td> <td>$R \rightarrow + T \{ \text{print}('+'); \} R$</td> </tr> <tr> <td>5 + 2</td> <td>$T \rightarrow \text{num} \{ \text{print}(\text{num.val}); \}$</td> </tr> <tr> <td>+ 2</td> <td>$R \rightarrow + T \{ \text{print}('+'); \} R$</td> </tr> <tr> <td>2</td> <td>$T \rightarrow \text{num} \{ \text{print}(\text{num.val}); \}$</td> </tr> </tbody> </table>	Input	Translation	9 + 5 + 2	$S \rightarrow T R$	9 + 5 + 2	$T \rightarrow \text{num} \{ \text{print}(\text{num.val}); \}$	+ 5 + 2	$R \rightarrow + T \{ \text{print}('+'); \} R$	5 + 2	$T \rightarrow \text{num} \{ \text{print}(\text{num.val}); \}$	+ 2	$R \rightarrow + T \{ \text{print}('+'); \} R$	2	$T \rightarrow \text{num} \{ \text{print}(\text{num.val}); \}$	5	Ana lyze	CO3
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<p>c. Design a L- Attributed Definition for converting a signed binary value to a decimal number. Consider the Production: G:- $D \rightarrow N B$ $B \rightarrow N B \mid \epsilon$ $N \rightarrow 0 \mid 1$</p> <p>Also construct the Annotated Parse tree for input string "1101" Hint: Binary value:= 1101 should be converted to Decimal value -5</p>	6	Cre ate	CO3														