SNS College of Technology, Coimbatore-35.
(Autonomous)
B.E/B.Tech- Internal Assessment -I
Academic Year 2023-2024(ODD)
Fifth Semester

B
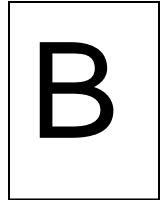
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
ANSWER KEY
19CSB301 – AUTOMATA THEORY AND COMPILER DESIGN

Time: $1^{1/2}$ Hours   **Maximum Marks: 50**

Answer All Questions

PART-A (5 x 2 = 10 Marks)

1. Write the Rules for Type 0 and Type 2 Grammar in Chomsky Hierarchy   CO1   UND

   Type 0:   bAa → aa ,   S → s

   Type 2:

   A → aBb

   A → b

   B → a

2. List the cousins of compiler   CO1   UND

   Preprocessor, Assembler, Linker & Loader

3. Differentiate NFA and DFA   CO1   ANA

DFA	**NFA**
DFA stands for Deterministic Finite Automata.	NFA stands for Nondeterministic Finite Automata.
For each symbolic representation of the alphabet, there is only one state transition in DFA.	No need to specify how does the NFA reac according to some symbol.
DFA cannot use Empty String transition.	NFA can use Empty String transition.
DFA can be understood as one machine.	NFA can be understood as multiple little machines computing at the same time.

4. Construct the DFA for 0 (0+1)*   CO1   ANA

5. Define Sentinel   CO2   REM

Sentinels − Sentinels are **used to making a check**, each time when the forward pointer is converted, a check is completed to provide that one half of the buffer has not converted off. If it is completed, then the other half should be reloaded.

PART–B (13 X 2 = 26 Marks)

6. (a)   Construct DFA equivalent to NFA N={(p,q,r,s), (0,1), S, p,   13   CO1   APP
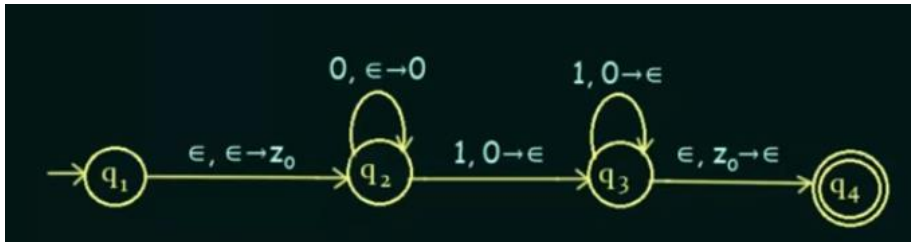   (s)}, where S is defined as

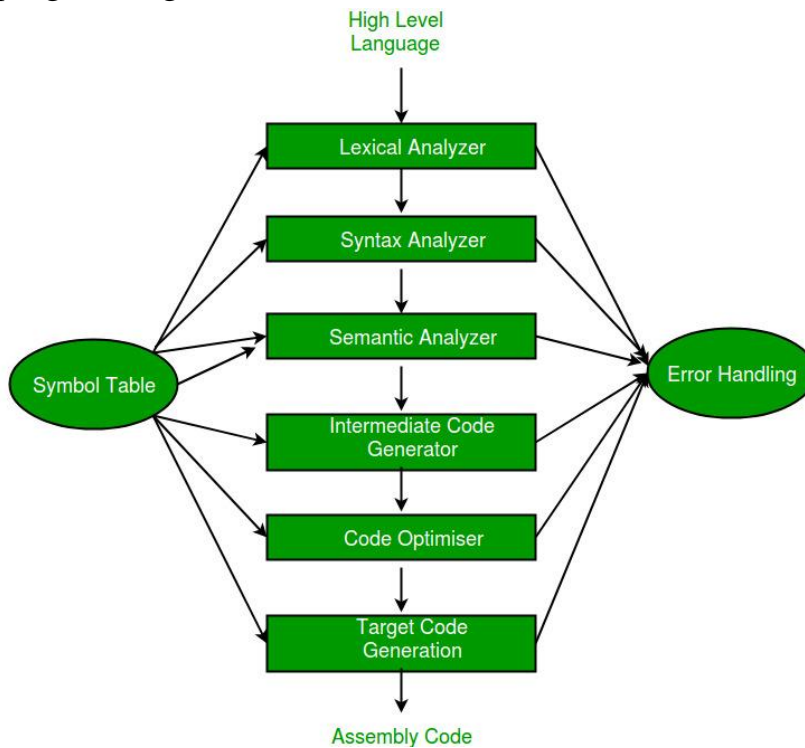| S	0	1
p	{p,q}	{p}
q	{r}	{r}
r	{s}	-
s	{s}	{s}

(b) Explain how Pushdown Automata is more powerful than Finite automata with its formal and graphical representation. Construct the Pushdown Automata for Language $L = \{0^n1^n|n>=0\}$ 13   CO1   ANA

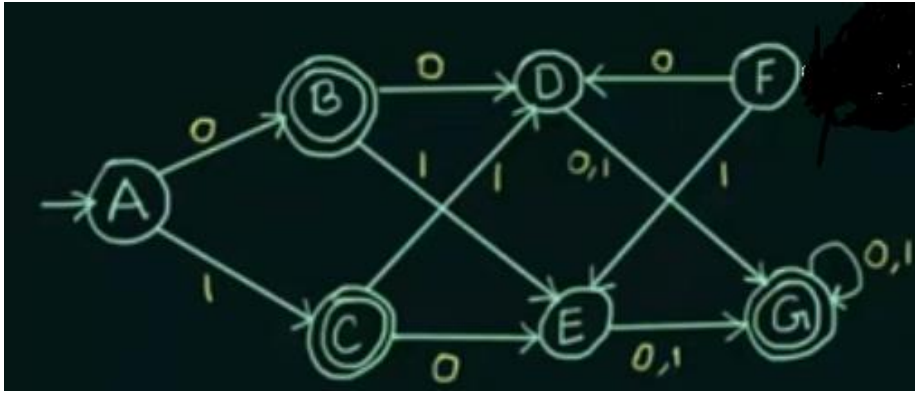7. (a) Elaborate the various phases of compiler and trace it with the program segment $(a=b+c*5)$ 13   CO2   APP

(or)

(b) Find the minimized DFA for the given DFA   13   CO1   ANA

Solution

0-Equivalence : {A,D,E} {B,C,G}

1-Equivalence : {A,D,E} {B,C} {G}

2-Equivalence : {A} {D,E} {B,C} {G}

3-Equivalence : {A} {D,E} {B,C} {G}

|	0	1
→{A}	{B,C}	{B,C}
{D,E}	{G}	{G}
{B,C}	{D,E}	{D,E}
{G}	{G}	{G}

8. (a) Construct the Regular Expression, DFA & NFA which accepts a string over {0,1} / {a,b}   14 CO1   APP

  i. Set of strings that has exactly one a

 ii. set of strings that has atmost 1a

iii. set of strings that has atleast 1a

 iv. set of strings that start with 0 and end with 11

<div align="center">(or)</div>

(b) Outline on following:

(i) How language is processed explain with neat diagram?   4   CO2   UND

<div align="right">10   CO2   UND</div>
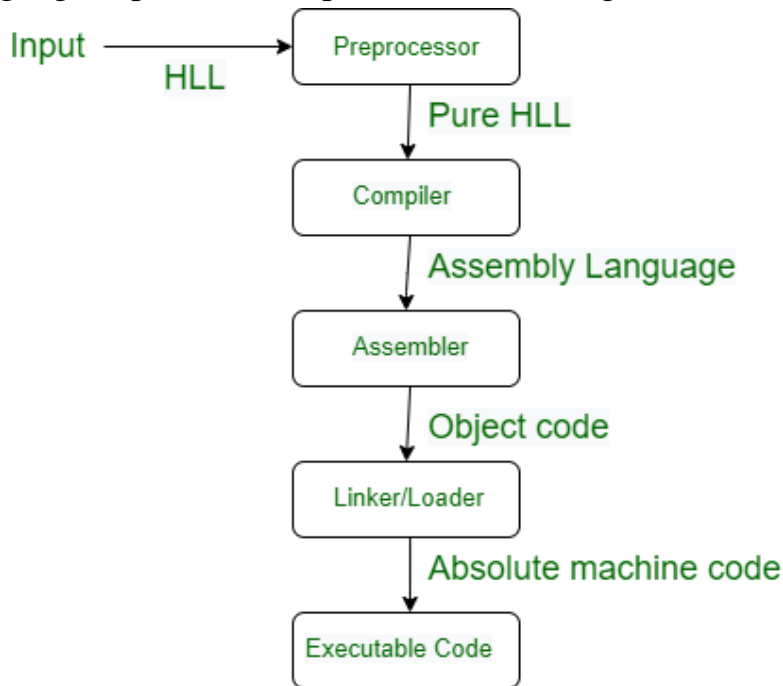
(ii) Buffer pair for sentinels

Two pointers to the input are maintained:

Pointer **lexemeBegin,** marks the beginning of the current lexeme, whose extent we are attempting to determine.

Pointer **forward** scans ahead until a pattern match is found; the exact strategy whereby this determination is made will be covered in the balance of this chapter.