Total number of printed pages = 4

**19/6th Sem/UCSE 601**



**2022**

# COMPILER DESIGN

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. Assume that to access a library system your roll number is the user id and you have to choose a password. Following are the criteria to choose the password :

   (i) Password should contain upper case and lower case letters.

   (ii) Password should contain letters and numbers.

   (iii) Password should contain at least one special character {@, #, $, &}.

   (iv) Password should not start with a special character.

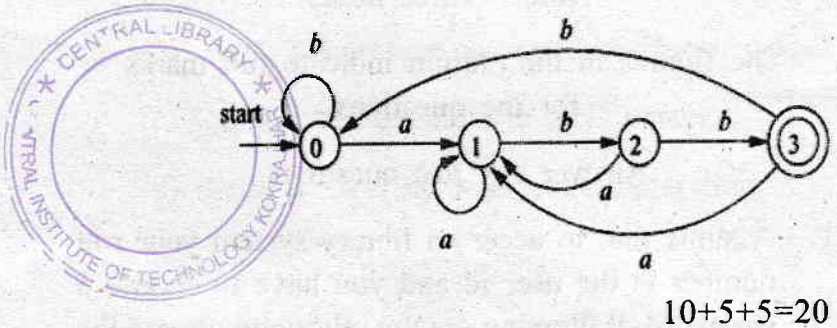
[Turn over

(v) Minimum length of the password (the default value is 8).

(a) Propose an efficient method to validate the password.

(b) Design an NFA for the regular expression $r = (aa^* + bb^*)^*$.

(c) Describe the language accepted by the DFA






10+5+5=20

2. (a) What is ambiguous grammar ? What is the problem of ambiguous grammar in parsing ? Explain with an example.

(b) Is the following grammar ambiguous ? Explain your answer.

$S \rightarrow aB \mid bA \mid SS$

$A \rightarrow a \mid S$

$B \rightarrow b \mid S.$ 15+5=20

3. Consider the grammar

$S \rightarrow iEtS \mid iEtSeS \mid a$

$E \rightarrow b$

(a) Remove the left recursion and left factoring if exists.

(b) Create the LL (1) parsing table.

(c) Is the grammar LL (1) ? Explain your answer.

4+12+4=20

4. Consider the grammar 10+10=20

$S \rightarrow L = R \mid R$

$L \rightarrow *R \mid \mathbf{id}$

$R \rightarrow L$

(a) Show LR (0) items of the grammar.

(b) Constrict the SLR parsing table.

5. Consider the code snip

```
i = m–1 ; j = n ; v = a[n] ;
while (1)  {
    do i = i+1 ; while (a[i] < v) ;
    do j = j–1 ; while (a[j] > v) ;
    if (i > = j) break ;
    x = a[i] ; a[i] = a[j] ; a[j] = x ;
}
x = a[i] ; a[i] = a[n] ; a[n] = x ;
```

(a) Convert into three address code.

(b) Identify the basic blocks and draw the flow graph.

(c) Describe the code optimization techniques.

10+5+5=20

6. (a) Explain, the grammar is not suitable for the predicting parsing.

$A \rightarrow A \mid B \quad A \rightarrow a|c \quad B \rightarrow b|c.$

(b) Write a short note on recursive-descent parser.

(c) Explain the conflicts in SLR parser.

(d) Write a short note on code generation.

5×4=20