2018

MCA 4th Semester Examination

COMPILER CONSTRUCTION

PAPER—MCA-403

Subject Code—32

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any *five* questions.

1. (a) Find FIRST and FOLLOW for each non-terminal :

$S \rightarrow ABCDE$

$A \rightarrow a/\in$

$B \rightarrow B/\in$

$C \rightarrow c/\in$

$D \rightarrow d/\in$

$E \rightarrow e/\in$

(b) Perform left factor of the grammar

$S \rightarrow aAd \ / \ aB$

$A \rightarrow b/c$; $B \rightarrow ccd \ / \ ddc$. (5+5)+4

2. (a) Eliminate left recursion in

$$A \rightarrow b/Bd \; ; \; B \rightarrow Bc/Ac.$$

(b) Construct LL(1) parsing table and verify whether it is LL(1) or not.

$S \rightarrow ABDh$
$B \rightarrow cC$
$C \rightarrow bC/\in$
$D \rightarrow EF$
$E \rightarrow g/e$
$F \rightarrow f/\in$

4+(5+5)

3. (a) Check whether the following Grammar is SLR(1) :

$S \rightarrow XYa\#$
$X \rightarrow a/Yb$
$Y \rightarrow \in/c$

(b) Give an example of a grammar that is LL(1) but not SLR(1) explain.

10+4

4. (a) Check whether the following grammar is CLR(0) or not

$S \rightarrow (L)$
$S \rightarrow x$
$L \rightarrow S$
$L \rightarrow L, S$

(b) What is the advantage of left recursive grammar over right recursive grammar in LR parsing explain with suitable example.

10+4

5. (a) Comtruct *LALR* parsing table for the grammar

$S' \rightarrow S$

$S \rightarrow AA$

$A \rightarrow aA$

$A \rightarrow b$

(b) A grammar containing left recursion cannot be LL(1), therefore a grammar containing right recursion cannot be LR(1). Comment. 10+4

6. (a) Generate three address code for following program fragment :

```
While (A < C) and (B > D) do
  if A = 1 then C = C + 1
  else
      while A < = D do
          A = A + 3.
```

(b) Write Quadruple, triple and indirect triple of three address code statement

$x = (a + b) * - c/d.$ 5+(3+3+3)

7. What is compiler ? Explain the different phases of compiler with suitable example. Write the function of Error Handler and symbol table management. 2+10+2

8. (a) What is code optimization ?

(b) What is basic block and flow graph ?

(c) Comtruct DAG for the basic block whose code is given below :

```
t1 = b + c
t2 = d * e
t3 = t2 * t1
t3 = t3 * f
x = t1 – t3
```

(d) Consider the following basic block

```
t1 = b + c
t2 = d * e
t3 = b + c
t4 = t2 * t3
t5 = t4 * f
x = t1 – t5
```

Which of the following optimizations are possible to be carried out with the above basic block.

[Internal Assessment : 30]

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