2017

MCA

4th SEMESTER EXAMINATION

COMPILER DESIGN

PAPER—MCA-403

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.

1. (a) $A \longrightarrow BCD$

           $B \longrightarrow bB/\epsilon$

           $C \longrightarrow Cg/g/ch/i$

           $D \longrightarrow AB/\epsilon$

   Calculate FIRST and Follow sets for the above grammar.   3+4

   (b) Briefly explain about the Phases of a Compiler.   7

2. (a) Construct the SLR(1) parsing Table for the following grammar :

$$E \longrightarrow (L) / a$$
$$L \longrightarrow L, E / E \qquad 7$$

(b) Using the above table show the parsing stack and the actions of an SLR(1) parser for the input string ((a), a, (a, a)). 7

3. (a) Show that the grammar is LR(1) but not LALR(1).

$$S \longrightarrow Aa / bAc / Bc / bBa$$
$$A \longrightarrow d$$
$$B \longrightarrow d \qquad 10$$

(b) What is left recursion ? Explain the elimination of left recursion with example. 4

4. (a) Give a syntax Directed translation Scheme to translate statements in a language with the following production.

$$O \longrightarrow id L$$
$$L \longrightarrow ,id L / :T$$
$$T \longrightarrow integer / real. \qquad 6$$

(b) Write three address code for,

While (a<b) do

```
    if (c<d) then
        x = x + z
    else
        x = y - z.                              5
```

(c) What is meant by bootstrapping ?   3

5. (a) What is the need of code optimization ?   2

(b) Explain the different levels of code optimization with examples.   6

(c) What is basic block and flow graph ? How can it be constructed ?   6

6. (a) Construct DAG for the following Basic Block,

```
        A[I] = B
        *P = C
        D = A[J]
        E = *P
        *P = A[I].                               5
```

(b) Explain Basic final code generation techniques with examples.   9

7. (a) Translate the expressions,

$$A = - B * (C + d) / E$$

into (i) Quadraples, (ii) Triples, and (iii) Indirect
Triples. 9

(b) What is annotated parse tree ? Construct annotated
parse tree for, $(4 * 7 + 1) * 2$. 5

8. Answer any *seven* questions : 7×2

(a) What is cross compiler ?

(b) What is left factoring ? How do we remove left
factoring ?

(c) What is dependency graph ?

(d) What are the features of symbol Table ?

(e) What is LR(k) grammar ?

(f) What is LL(1) parsing ?

(g) What is syntax analysis ?

(h) What are the application of DAG ?

(i) What is ambiguous grammar ? Give example.

(j) What is lex and yacc ?

[Internal Assessment : 30 Marks]

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