Faculty of Engineering & Technology
Seventh Semester B.E. (Infor. Tech.) (C.B.S.)
Examination
ELECTIVE–I : COMPILER DESIGN

Time—Three Hours]   [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1)   All questions carry marks as indicated.

(2)   Solve Question No. **1 OR** Question No. **2**.

(3)   Solve Question No. **3 OR** Question No. **4**.

(4)   Solve Question No. **5 OR** Question No. **6**.

(5)   Solve Question No. **7 OR** Question No. **8**.

(6)   Solve Question No. **9 OR** Question No. **10**.

(7)   Solve Question No. **11 OR** Question No. **12**.

(8)   Illustrate your answers wherever necessary with
       the help of neat sketches.

9. (a) Explain the significance of computing u-d chain information wih example. 7

(b) How do you eliminate common sub-expression ? Give suitable example. 6

OR

10. (a) Explain different code optimization techniques. What do you mean by machine dependent and machine independent optimization ? 8

(b) How dominators can be used to detect loops in flow graph ? 5

11. (a) State whether the order of computation affects the cost of generated code. If yes find an optimal order of computation and generate code for the following sequence of three address code :

$$t_1 = a + b$$

$$t_2 = c + d$$

$$t_3 = e - t_2$$

$$t_4 = t_1 - t_3 \qquad 6$$

grammar :

$$S \rightarrow Aa \mid a\ Ac \mid Bc \mid bBa$$

$$A \rightarrow d$$

$$B \rightarrow d. \qquad 8$$

(b) Explain the significance of FIRST and FOLLOW with respect to top down and bottom up parsing. 6

OR

4. (a) Construct LL (1) Parsing table for the following grammar :

Input $\rightarrow$ Expression1

Expression1 $\rightarrow$ Term Rest-of- Expression

Term $\rightarrow$ id | Parenthesized -Expression

Parenthesized-Expression $\rightarrow$ (Expression1)

Rest-of-Expression $\rightarrow$ + Expression1 | $\in$. 6

(b) Construct SLR (1) Parsing table for the following grammar :

$$E \rightarrow E + T$$

$$E \rightarrow T$$

$$T \rightarrow T *F$$

$$T \rightarrow F$$

$$F \rightarrow (E)$$

$$F \rightarrow id$$

Show moves made by parser for input id * id + id.

8

5. (a) Explain different intermediate code representation techniques. 7

(b) What is synthesized attributes and inherited attributes ? Explain with example. 6

OR

6. (a) Using syntax directed translation scheme, obtain three-

address code for following expression. Also draw annotated parse tree :

$$P < Q \text{ or } R < S \text{ and } T < U. \qquad 7$$

(b) Write SDTS for the following :

(i) If-then-else statement

(ii) While statement. 6

7. (a) Comment on use of symbol table for the compiler. What information should be associated with a symbol name in the symbol table ? Describe the data structure for the symbol table and compare them. 8

(b) Discuss different storage allocation techniques and their implementation. 6

OR

8. (a) Explain with example error recovery in LR parsing. 8

(b) Explain various errors seen by every phase of compiler. Give example for each. 6

(9) Assume suitable data wherever necessary.

(10) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) What is front end and back end of a Compiler ? What are the advantages of breaking up the compiler functionality into these two distinct stages ? 7

(b) Why design of a compiler is more complex than that of an assembler ? 3

(c) Explain Boot strapping with suitable example. 3

OR

2. (a) Explain different Compiler writing tools. 6

(b) What is Compiler and Interpreter ? Differentiate between them. 4

(c) Explain the role of lexical analyzer in compiler design. 3

3. (a) Construct LALR (1) parsing table for the following

(b) Why implementation of code generation phase is difficult ? What are the issues in code generation ? 7

OR

12. (a) Consider the following expression and determine the no. of registers required to evaluate the given expression :

$$Z = (A + B) * (C - D) / E + D. \qquad 4$$

(b) Explain different code generation techniques which technique generate efficient object code ? 9