M06304

THRID SEMESTER M.C.A. DEGREE EXAMINATION, JUNE 2006
MCA2K304 – PRINCIPLES OF COMPILERS

Max Time: 3 hrs   Max Marks: 100

Answer any *five* questions

1   (a) Explain with diagram the different phases of a compiler   (15)

    (b) State and explain the necessity of dividing the analysis phase into lexical analysis
    and syntactic analysis   (5)

2. (a) Distinguish between a regular expression and context-free grammar. Write the
    instruction to convert a regular expression to a context-free grammar   (7)

    (b) Explain *leftmost* derivations of a grammar. By considering the following grammar
    construct a leftmost derivation of the sentence (a , (a , a))

$$S \rightarrow (L) | a \qquad L \rightarrow L , S | S$$ (5)

    (c) Explain the role of the parser with suitable diagram. Also state different Error –
    Recovery strategies of the parser to recover from a syntactic error.   (8)

3   (a) Describe briefly the difficulties of the top-down parser   (5)

    (b) Construct LL (1) parsing table for the following grammar

$$S \rightarrow ABC \qquad A \rightarrow a | Cb \; \varepsilon \qquad B \rightarrow C \; dA | \varepsilon \qquad C \rightarrow e | f$$ (15)

4   (a) For the following grammar, give the rightmost derivation for the string "ibtibtaa"

$$S \rightarrow iCtS \qquad S \rightarrow iCtSeS \qquad S \rightarrow a \qquad C \rightarrow b$$ (5)

    (b) Show that the following grammar

$$S \rightarrow Aa | bAc | dc | bda \qquad A \rightarrow d$$

    is LALR(1)   (15)

5   (a) Explain Annotated Parse Tree. Construct an Annotated Parse Tree for the following
    grammar on input **101.101**

$$S \rightarrow L . L | L \qquad L \rightarrow LB | B \qquad B \rightarrow 0 | 1$$ (7)

    (b) (i) Explain Syntax-Directed Definition by specifying its form   (5)

        (ii) What is an S-attributed Definition? Explain the different data structures used in
        the bottom-up evaluation of S-attributed definition.   (5)

    (c) Explain Dependency Graph by taking suitable example.   (3)

6   (a) Explain the necessity of generating intermediate code instead of generating the
    target code directly   (5)

    (b) State different techniques that are used in the implementation of three-address code
    with example. Also give the comparison between these methods.   (15)

7. Explain various code optimization techniques with examples   (20)