63/2 (SEM–4) CSIT 4·2

2024

COMPUTER SCIENCE AND TECHNOLOGY

Paper : CSIT 4·2

(Compiler Design)

Full Marks : 80

Pass Marks : 32

Time : Three hours

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

1. Answer the following : 1×5=5

   (i) Top-down parsing generates the parse tree in which of the following order ?

   (a) Pre-order

   (b) In-order

   (c) Post-order

   (d) All of the above

(ii) Which concept of grammar is used in the compiler ?

(a) Lexical analysis

(b) Parser

(c) Code generation

(d) Code optimization

(iii) A tool automatically generating a lexical analyzer for the language is defined as

(a) Lex

(b) YACC

(c) Handler

(d) All of the above

(iv) Which of the following is the less powerful parsing method ?

(a) LL (1)

(b) Cannonical LR

(c) SLR

(d) LALR

(v) Which two functions are required to construct a parsing table in predictive parsing technique ?

(a) CLOSURE ( ) and GOTO ( )

(b) FIRST ( ) and FOLLOW ( )

(c) ACTION ( ) and GOTO ( )

(d) None of the above

2. Answer the following : 2×5=10

(a) Write a regular expression for relation operator (relops).

(b) Convert the given regular expression into DFA :

(a/b)* a (a/b)

(c) Prove the grammar is ambiguous

$S \rightarrow S+S/S*S/(S)/id$

(d) Explain top-down parsing with example.

(e) Define handle with examples.

3. Answer the following : 3×5=15

(a) Explain predictive parsing technique.

(b) Eliminate left recursion for the following grammer :

$S \rightarrow S+S/S-S/S*S/num$

(c) Explain the concept of bootstrapping.

(d) Differentiate among tokens, patterns, lexeme.

(e) Design a finite automata that accepts set of strings such that every string ends with 00, over alphabets {0,1}.

4. Answer ***any five*** of the following : 10×5=50

(i) (a) Find FIRST of all the non-terminals of the following grammar : 5

$S \rightarrow ACB/CbB/Ba$

$A \rightarrow da \ / \ BC$

$B \rightarrow g/\varepsilon$

$C \rightarrow \varepsilon$

(b) What is LEX ? Write the structure of Lex program. 5

(ii) Define augmented grammar ? Construct the LR(0) items for the following grammer ? 2+8=10

$S \rightarrow L = R$

$S \rightarrow R$

$L \rightarrow *R$

$L \rightarrow id$

$R \rightarrow L$

(iii) (a) Do left factoring in the following grammar : 3

$A \rightarrow aAB \ / \ aBc \ / \ aAc$

(b) Using parsing table show that the given grammar is LL(1). 7

$E \rightarrow E+T/T$

$T \rightarrow T*F/F$

$F \rightarrow (E)/id$

(iv) Explain LR parser with different components. Explain top-down parser with different parsing technique used for top-down parsing. 5+5=10

(v) Construct the LR(1) items for CLR and LALR with parsing table for the following grammar : 10

$S \rightarrow CC$

$C \rightarrow cC/d$

(vi) Write short notes on : ***(any two)*** 5×2=10

(a) LL(1) grammar

(b) YACC

(c) Role of Parser

(d) Context-free grammar (CFG)

(e) DFA and NDFA