



HALDIA INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION UNDER MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL)

Paper Code: ESC 501

Paper Name: Compiler Design

Time Allotted: 3 Hours

Full Marks: 70

The figures in the margin indicate full marks

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

Group – A

(Multiple Choice Type Questions)

Choose the correct alternatives from the followings:

15 x 1 = 15

1. (i) Which one is mostly related to symbol table[CO1]

- a) Keeping all of the names of all entities in one place b) Finding name's scope
c) Type checking d) All of the mentioned

(ii) Which phase of the compiler is also known as Scanner?[CO1]

- a) Syntax Analysis b) Lexical Analysis c) Semantic Analysis d) Code generation

(iii) YACC builds up[CO3]

- a) SLR parsing table b) LALR parsing table
c) Canonical LR parsing table d) None of these

(iv) For a grammar having production rule $A \rightarrow BC$ and semantic rule $\{B.value = A.value\}$. The grammar is[CO4]

- a) S-attributed b) L-attributed c) both a and b d) none

(v) Which data structure is mainly used during shift reduce parsing?[CO3]

- a) Pointer b) Array c) Stack d) Queue

(vi) A compiler that runs on one machine and produces code for a different machine is called [CO1]

- a) Cross Compiler b) One pass Compiler c) Two pass Compiler d) None of these

(vii) Applications of parsing technique can be found in [CO3]

- a) Web browser b) SQL c) natural language processing d) all of the above

(viii) In which phase of compilation type checking is done? [CO2]

- a) Syntax analysis b) Semantic analysis c) Lexical analysis d) All of the above

(ix) Number of token in the code is [CO2]

$id = id + 5$

- a) 3 b) 4 c) 5 d) 2

(x) Which one is preferred to implement lexical analyser?[CO2]

- a) DFA b) NFA c) Regular expression d) Syntax tree

(xi) Syntax of a language can be specified by [CO2]

- a) Context sensitive grammar b) Context free grammar
c) Regular expression d) All of the above

(xii) Which regular expression is suitable for representing an identifier in a language? [CO2]

- a) $letter(letter|digit)^*$ b) $(letter|digit)^*$ c) $letter(letter.digit)^*$ d) None of the above

(xiii) Which of the following error can a compiler check? [CO3]

- a) Syntax Error
- b) Logical Error
- c) Both Logical and Syntax Error
- d) Compiler cannot check errors

(xiv) What does a bottom-up parser generate? [CO3]

- a) leftmost derivation in reverse
- b) rightmost derivation in reverse
- c) rightmost derivation
- d) leftmost derivation

(xv) Another name of top-down parsing is _____ [CO3]

- a) Predictive parsing
- b) Shift reduce parsing
- c) Recursive descent parsing
- d) None

Group – B

(Short Answer Type Questions)

Attempt any three from the followings:

3 x 5 = 15

2. a) Explain the role of lexical analyser in compiler. [CO2]

2+3

b) What is 2N-input buffering? [CO2]

3. Design a DFA for the language $L = \{\text{all strings prefix with "ab"}\}$ where $\Sigma = \{a, b\}$. [CO2] 5

4. Eliminate left recursion from the grammar: [CO3]

$S \rightarrow Aa \mid b$

$A \rightarrow Sc \mid d$

5

5. Consider the context free grammar (CFG) below: [CO3]

$E \rightarrow E + E \mid E - E \mid id$

Check if the CFG is ambiguous for deriving the string "id + id * id".

5

6. a) What is the syntax-directed translation (SDT)? [CO4]

b) What are the S-attributed and L-attributed SDT? Explain with examples. [CO4]

1+4

Group – C

(Long Answer Type Questions)

Attempt any four from the followings:

4 x 10 = 40

7. Explain in brief different phases of a compiler with the help of instruction below: [CO1]

Total = initial + rate * time

10

8. a) State the utility of 3 address instruction and DAG. [CO6]

b) Distinguish between quadruples, triples and indirect triples for the expression. [CO4]

$x = y * -z + y * -z$

4+6

9. Consider the grammar below: [CO3]

$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow id_1 \mid id_2 \mid id_3$

Show the parsing of string "x+y*z" by shift reduce parser.

10

10. Construct LR(0) parsing table for the grammar below: [CO3]

$S \rightarrow AA$

$A \rightarrow aA/b$

10

11. a) Discuss different storage allocation strategies in compiler. [CO5]

b) Explain any two methods of garbage collection. [CO5]

5+5

12. a) Write down Chomsky hierarchy of grammars. [CO2]

b) Show leftmost and rightmost derivation of "id + id * id" using the grammar below: [CO3]

$$E \rightarrow E + E/E * E/id$$

5+5

Answer Key:

Group – A

1. (i) d	(ii) c	(iii) b	(iv) c	(v) b	(vi) b
(vii) a	(viii) b	(ix) d	(x) c	(xi) d	(xii) c
(xiii) d	(xiv) a	(xv) d	(xvi) d	(xvii) b	(xviii) c
(xix) a	(xx) b	(xxi) a	(xxii) a	(xxiii) a	(xxiv) d
(xxv) a	(xxvi) a	(xxvii) b	(xxviii) a	(xxix) c	(xxx) b