Question Paper Code : 8378

B.Tech. (Semester-V) Examination, 2021

(Odd Semester)

COMPILER DESIGN

[Paper : CS-505]

Time : Three Hours] **[Maximum Marks : 70**

Note : Answer **any five** questions. Each question carry **equal** marks.

1. Describe various phases of a compiler with example ? Differentiate a phase and pass. Compare multipass and single pass compiler. Write application of compiler. [14]

2. (a) Give the rules for computation of FIRST(X) and FOLLOW(X). Construct FIRST and FOLLOW sets for the following grammar. [7×2=14]

E-->TE'

E'-->+TE'|ε

T-->FT'

T'-->*FT'|ε

F-->(E)|id

(b) What do you mean by left most derivation and right most derivation. Explain with an example.

3. (a) Consider the following grammar. [7×2=14]

S-->0A/1B/0/1

A-->0S/1B/1

B-->0A/1S

Construct leftmost derivations and parse trees for the following sentences

(i) 0101

(ii) 1100101

(b) Differentiate between Compiler and Interpreter. Find the number of token in the following C statement :

printf("i=%d,&i=%x",i,&i);

4. (a) Describe Data structure for symbol table. What are the various operations performed on the symbol table ? Explain. [7×2=14]

(b) Explain logical phase error and syntactic phase error. Also suggest methods for recovery of error.

5. (a) What is ambiguous grammar ? Eliminate ambiguities for the grammar : [7×2=14]

E-->E+E|E*E|(E)|id.

(b) Compare and contrast the quadruples, triples and indirect triples.

6. (a) What is Syntax Directed Translation ? Differentiate between S-attributed definitions and L-attributed definitions with example. [7×2=14]

(b) What is code optimization ? What are its advantages? What are the problems in optimizing compiler design?

7. (a) Explain Tokenization. How many types of token are used in programming ? [7×2=14]

(b) What is Loop optimization and Global data analysis ? Explain with example.

8. (a) What is bootstrapping in compiler design ? Explain yacc compiler and Relocatable Machine Code ? [7×2=14]

(b) Differentiate between Common sub-expression elimination and Dead-code elimination with suitable example.

9. (a) What is Directed Acyclic Graph (DAG) ? How it can be used to eliminate expression ? Give example. [7×2=14]

(b) Consider the grammar with non-terminals N={S,C,S1}, terminals T={a,b,i,t,e}, with S as the start symbol, and the following set of rules :

$S \rightarrow iCtSS_1|a$

$S_1 \rightarrow eS|\in$

$C \rightarrow b$

Check whether given grammar id LL(1) or not. Given reason.

10. Explain the following in detail : [14]

(i) Copy Propagation

(ii) Live variables analysis

(iii) Block structure

(iv) Activation record

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B.Tech. Odd Vth Semester Examination, 2022–23

COMPILER DESIGN

Paper : CS–505

Time : 3 Hours] [*M.M. : 70*

Note :– Attempt any *five* questions. All questions carry equal marks.

1. (a) Write the indirect tripple for the following :

$$(x + y) * (y + z) + (x + y + z)$$

(b) Construct the DAG for the following expression :

$$X = (a + b) * (b + c) + (a + b + c)$$

(c) Compute the first and follow for the following :

$$E \rightarrow E + T/T$$

$$T \rightarrow T * F/F$$

$$F \rightarrow (E)/id$$ 5,5,4

2. (a) Construct LALR parsing table for the given grammar :

$$S \rightarrow BB$$

$$B \rightarrow aB/b$$

(b) Discuss the following terms :

(i) Basic block

(ii) Flow graph

```
if (c < d)
x = y + z;
else
x = y - z;
}
```

FACULTY OF ENGINEERING & TECHNOLOGY
UNIVERSITY OF LUCKNOW
Mid-Term Examination - 1
B. TECH SEMESTER – V, 2021-22

Student's Name & Roll No. .....

Subject Code: CSE-505 **Subject: Compiler Design**
Time: 1 Hrs. **Max. Marks: 20**
Instruction: Attempt all sections. **Branch: CSE**

SECTION A

1. Attempt all parts **(1X5 = 5)**

a) Define Cross Compiler.
b) Differentiate between YACC and Lex Compiler.
c) Differentiate between Compiler and Interpreter.
d) Remove Left Recursion from Grammar:
E→E+T/T, T→T*F/F, F→ id.
e) Explain predictive parsing Technique.

SECTION B

Answer any THREE questions. **(5X3 = 15)**

2. Explain phases of Compiler in detail.
3. Check that grammar is LL(1) or not :
E →TE', E'→+TE'/€, T→FT', F→*FT'/ €, F → id / (E).
4. Parse the String (a,(a, a)) Using operator Precedence Technique for the production rule: S→(L) / a
L→ L,S/ S
5. Use Shift Reduce Parsing to Parse the string (a,(a, a)) for grammar :
S→(L) / a
L→ L,S/ S

FACULTY OF ENGINEERING, UNIVERSITY OF LUCKNOW

Mid-Term Test - II

B.TECH. SEMESTER - V, 2022-23

Branch: CSE

Student's Roll No. .....

Subject Code: CS-505 **Subject Title: Compiler Design**

Time: 1 Hrs. **Full Marks: 20**

Note: Attempt questions from each section as per instructions. The symbols have their usual meaning.

SECTION A

1. *Attempt all parts of this question. Each part carries 1 mark.* **(1 x5=5)**

a) Differentiate between parse tree and abstract syntax tree.

b) Explain the problems associated with top down parser.

c) Explain the types of attributes associated with the grammar.

d) Remove left recursion from the grammar: E→E+E/E*E/a/b

e) Explain the conflicts during shift reduce parsing.

SECTION B

Attempt any THREE questions of the following. Each question carries 5 marks. **(5 x 3=15)**

2. Construct LALR parsing table for : S→BB, B→aB/b.

3. Write the quadruple, triple and indirect triple for : (x+y)*(y+z)+ (x+y+z).

4. Write SDD for the grammar: S→id=E, E→E+E/E*E/E/(E)/id

5. What are the advantages of DAG? Explain it with suitable example.

FACULTY OF ENGINEERING & TECHNOLOGY
UNIVERSITY OF LUCKNOW
Mid-Term Examination - 2
CSE 5th Sem 2021-22

Student's Name & Roll No. .....

Subject Code: CS 505 **Subject: Compiler Design**
Time: 1 Hrs. **Max. Marks: 20**
Instruction: Attempt all sections. **Branch: CSE**

SECTION A

1. Attempt all parts **(1X5 = 5)**

Explain the following in detail:

a. Copy Propagation
b. Live variables analysis
c. Block structure
d. Activation record.
e. DAG

SECTION B

Answer any THREE questions. **(5X3 = 15)**

Q1. What is Directed Acyclic Graph(DAG)?How it can be used to eliminate expression? Give example.

Q2. Differentiate between Common sub-expression elimination and Dead-code elimination with suitable example.

Q3 What is code optimization? What are its advantages? What are the problems in optimizing compiler design.

Q4 What is Syntax Directed Translation? Differentiate between S-attribute definitions and L-attributed definitions with example ?

(c) Construct predictive parsing table for the following grammar :

$$E \rightarrow E + T/T$$

$$T \rightarrow T * F/F$$

$$F \rightarrow F/a/b$$

5,5,4

3. (a) Differentiate between stack allocation and heap allocation.

(b) List the data structures used in implementation of symbol table.

(c) Construct an annotated parse tree for the following grammar and mention their semantic rules also :

$$L \rightarrow MN$$

$$M \rightarrow int$$

$$M \rightarrow real$$

$N \rightarrow N_1$, id

$N \rightarrow$ id

5,5,4

4. (a) What do you understand by lexical phase error ?

(b) Write short notes on the following :

(i) Loop unrolling

(ii) Loop jamming

(c) Explain how loop optimization is performed during code optimization of compiler. 5,5,4

5. (a) Differentiate between Cross compilation and Boot strapping with suitable example.

(b) Explain lexical analyzer generator with proper example.

(c) Write short notes on the following :

(i) Assembler

(ii) Interpreter 5,5,4

6. Explain the various phases of compiler in detail.

7. Check that whether the grammar is LL(1) :

$$S \rightarrow 1AB/\varepsilon$$

$$S \rightarrow 1AC/0C$$

$$B \rightarrow 0S$$

$$C \rightarrow 1$$

A → 0/1

8. Construct SLR parse table for the following grammar and also check whether the input string "id * id + id" will be accepted using SLR parsing table or not :

$$S \rightarrow E + E$$

$$E \rightarrow E * E$$

$$E \rightarrow id$$

9. Write syntax directed definition for the given assignment statement :

$$S \rightarrow id = E$$

$$E \rightarrow E + E$$

$$E \rightarrow E * E$$

$$E \rightarrow -E$$

$$E \rightarrow (E)$$

$$E \rightarrow id$$

10. Generate the three address code for the following code fragment :

while $(a > b)$

{