National Institute of Technology Mizoram

End - Semester Examination, Even Semester - (2022-2023)

Principles of Compiler Design (CSL 1601)

B.Tech. 6th Semester

Full Marks: 50 marks

Duration: 2:30 hours

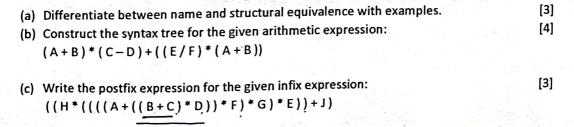
Answer all 5 (Five) Questions. All Questions carry same Marks (5*10 = 50 Marks)

Question 1

(a)	Differentiate between	n static and dynam	nic semantics of a language with examples.	[2]	
) What are the issues/challenges while designing a code generator. What are the different				
,,-,	components of runtin			[2]	
(c)		_	are the methods to perform compile time		
(0)	evaluation.	evaluation. What		[2]	
(d)	If you have 5 source languages and 2 target machines. How many code optimizers and code				
	generations would you require if (i) you don't use intermediate code (ii) you use				
	intermediate code.			[2]	
(e)	What is a basic block. What are the two kinds of local (within a basic block)				
(0)	transformations/optin			[2]	
Questi	on 2				
(a)	Differentiate hetween	L-attributed gran	nmar and S-attributed grammar. What type of		
(a)			synthesized attributes, (ii) inherited attributes	i. [3]	
/1-1			annotated parse tree for the given expression		
(b)	2+3*5. Also draw the			[7]	
	2+3*5. Also draw the	dependency grapi			
		Productions	Semantic rules		

Productions	Semantic rules		
$E \rightarrow E_1 + T$	E.val := E _{1.} val+T.val		
E→T	E.val := T.val		
T→T ₁ *F	T.val := T ₁ .val * F.val		
T→F	T.val := F.val		
F→id	F.val := num.lexval		

Question 3



Question 4

(a) Generate the three-address code for the following

[5]

while (a < c and b > d) do
if
$$a = 1$$
 then $c = c + 1$
else
while $a <= d$
do $a = a + b$

(b) Write the three-address code and quadruple representation for: s = -z/a * (x + y)

[5]

Question 5

(a) Identify the basic blocks and draw the flow graph for the code below.

[5]

(b) Write the DAG for the intermediate code below. Also, write the final assembly code. Assume there are only two registers RO, R1 in the target machine.

$$a = b + c$$

 $b = a - d$

$$c = b + c$$

c = b + c

d = a - d

National Institute of Technology Mizoram

Mid - Semester Examination, Even Semester - (2022-2023)

Principles of Compiler Design (CSL 1601)

B. Tech. 6th Semester

Full Marks: 30 marks

Duration: 1 hour 30 mins

Answer all 3 (Three) Questions. All Questions carry same Marks (3 * 10 = 30 Marks)

Question 1

- (a) What are the different types of languages and how are they represented? [1]
 (b) Checking the types of variables, evaluation of mathematical expressions, etc. are performed in which phase of a compilation process? [1]
 (c) Loop unrolling, inline functions, etc. are performed in which phase of a compilation process? [1]
 (d) What is bootstrapping with respect to a compiler? [1]
 (e) Differentiate between lexeme and token with an example? [1]
 (f) Given that binary number strings are read from left to right and may have leading zeroes, construct a DFA (Deterministic Finite Automaton) for: [5]
 - Binary number strings that represent numbers that are multiples of 4, e.g., 0, 100, 1000, 1100, and so on.
 - Clearly specify the input alphabet, set of states, start state, set of final states, transition function with transition diagram

Question 2

(a) The following grammar is not suitable for a top-down predictive parser (e.g., LL(1) parser).

[3+7]

 i. Identify the problem (e.g., 'left recursion' or 'need left factoring') and correct it by rewriting the grammar. (A non-terminal symbol may be added in the corrected grammar)

L -> Ra | Qba

R -> abaS | cabaS

S -> bcS | ∈

Q -> bbc | bc

ii. Compute the FIRST and FOLLOW sets and also dirsymb of the 'corrected grammar' from (i). Show that your new grammar satisfies the LL(1) condition based on dirsymb.

Question 3

(a) Construct the DFA and SLR parsing table for the following grammar.

[5+5]

S-> Aa | bAc | Bc | bBa

A -> d

B -> d

The Follow sets for the non-terminals are given below:

 $Follow(S) = \{\$\}, Follow(A) = \{a,c\}, Follow(B) = \{a,c\}$

Determine the type of conflict if there is any based on the parsing table constructed.

