Compiler Design- Exercises

24.10.2025

Q1. choose the correct option- 1 Minute

Which of the following is **NOT** typically checked during semantic analysis?

A) Type checking
B) Variable declaration
C) Syntax errors
D) Scope resolution

Q2. choose the correct option- 1 Minute

What type of analysis checks that all variables are declared before use?

A) Syntactic analysis
B) Semantic analysis
C) Lexical analysis
D) Code generation

Q3. choose the correct option- 1 Minute

Which of the following is an example of a static semantic check?

A) Array index out of bounds
B) Division by zero
C) Function called with incorrect number of arguments
D) None of the above

Q4. choose the correct option- 1 Minute

In an attribute grammar, a synthesized attribute:

A) Depends on the attributes of the child nodes
B) Depends on the attributes of the parent node
C) Is inherited from the parent node
D) None of the above

Q5. 5 Minutes

Explain the difference between synthesized and inherited attributes. Provide examples for each.

Q6- 6 Minutes

For the grammar

S→aAS | Epsilon

A→bA|c

define an attribute grammar that **counts the number of 'b's** in the derivation.

Q7- 4 Minutes

Construct DAG for the following expression:

((x+y)-((x+y)*(x-y)))+((x+y)*(x-y))

Q8- 7 Minutes

- Represent the following 3-address code as: **quadruples**, **triples**, **abstract-syntax tree** and **directed-acyclic graph**.

```
t1= a*c
t2=b+t1
t3=a*c
t4=d/t3
t5=t2-t3
```

Q9- 6 Minutes

Consider the intermediate code given below. Identify all basic blocks and draw the control-flow graph.

```
1. t1 = a + b
2. t2 = t1 * c
3. if t2 > 0 goto L1
4. t3 = t1 - d
5. t4 = t3 * 2
6. goto L2
7. L1: t5 = e + f
8. t6 = t5 * g
9. L2: return t6
```

Q10- 3 Minutes

Consider the following code-block:

```
a = 5;
b = a + 10;
c = b + 2;
```

Apply **constant propagation** and provide the optimized version of the code.

Q11- 4 Minutes

Consider the following code-block:

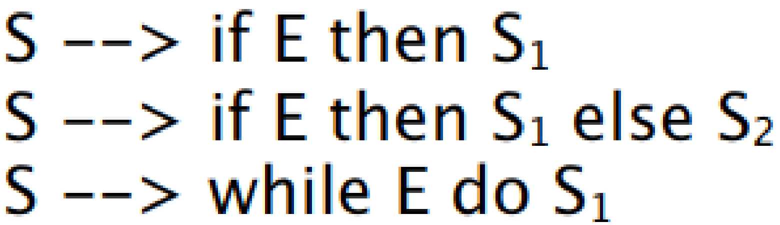
```
t1 = x * y
t2 = a + b
t3 = x * y
t4 = t3 + t2
```

Apply **common sub-expression elimination** and provide the optimized version of the code.

Q12- 10 Minutes

SDD/SDT for generating 3-address code

- Consider that we have the following constructs. Give semantic rules for generating **3-address code**



S --> if E then S_1
S --> if E then S_1 else S_2
S --> while E do S_1