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1. Distinguish between static and dynamic semantics.

Ans:

Static semantics

I. Static semantics refers to type checking and resolving declarations.
II. Earliest attempts to add semantics to a programming language.
III. Concern about the legal form of the program.
IV. It is named so because of the fact that these are checked at compile time.

Dynamic semantics

I. Dynamic semantics refers to expression, statements, and program unit of a programming language.
II. These are checked at run time.
III. No universally accepted notation has been devised for dynamic semantics.

2. Describe about operational and axiomatic semantics with examples.

Ans:

Operational Semantics

Provides a definition of program meaning by simulating the program's behavior on a machine model that has a very simple instruction set and memory organization.

Example:-

C statement

```
for (expr1; expr2; expr3) {
…..
}
```

Operational Semantics

```
expr1;
loop: if expr2 = 0 goto out
        …
        expr3;
        goto loop
out: …
```

Axiomatic Semantics

Axiomatic semantics provides a vehicle for developing proofs that a program is "correct". It is based on formal logic.
Approach: define axioms rules for each statement type in the language.

The expressions are called assertions

Precondition – before a statement
Postcondition – following a statement
Weakest precondition – least restrictive precondition that will guarantee the postcondition

Examples:

sum = 2 * x + 4

Postcondition:

sum > 1
sum = 2 * x + 1 {sum > 1}