**Lab No. 13**

**Behavioral Modeling for implementing the combinational and sequential circuits**

**Objective:**

In this lab students will learn how to implement

* Behavioral modeling using procedural assignment statements with the keyword always.
* Combinational circuits using behavioral modeling with case statement.

**Theory**

Behavioral modeling represents digital circuits at a functional and algorithmic level. It is used mostly to describe sequential circuits, but can also be used to describe combinational circuits. Behavioral descriptions use the keyword **always,** followed by an optional event control expression and a list of procedural assignment statements. The event control expression specifies when the statements will execute. The target output of a procedural assignment statement must be of the **reg** data type. Contrary to the **wire** data type, whereby the target output of an assignment may be continuously updated, a **reg** data type retains its value until a new value is assigned.

**Example**

Run the following code and observe its output

**module** mux\_2x1\_beh (m\_out, A, B, select);

**output** m\_out;

**input** A, B, select;

**reg** m\_out;

**always** @(A **or** B **or** select)

**if** (select \_\_ 1) m\_out \_ A;

**else** m\_out 5 B;

**endmodule**

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**Lab Exercise**

**Write down the Behavioral description of four-to-one-line multiplexer. Show testbench waveforms for it. [5]**

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**Using a case statement, develop and simulate a behavioral model of the 8, 4, –2, –1 to BCD code converter. [5]**

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