

ABSTRACT NO.: 558**TITLE:** Digital Design with SPARTAN 3E FPGA Digilent Module Board**AUTHORS:** Andy Bernard (05702917)
Billy- Dee Blades (806002893)
Prince Charles (807001020)**SUPERVISOR:** Dr. Davinder Sharma

Digital design in a broad sense is the 3-step process of design, manufacture and production of electronic circuits which may perform a series of functions. Once a complicated, time consuming and expensive process, various changes in the industry seek to encourage design and innovation while keeping cost at a minimum. Familiarization and full understanding of terms such as ModelSIM, VHDL, CAD, FPGA and ASIC is vital for the digital design process.

VHDL is the programming language used in the simulation of a digital circuit. The functionality, capabilities as well as the various styles/methodologies implemented with respect to circuit modeling were examined to a competent level of proficiency. ModelSIM is used to ensure the validity of the code and functionality of the circuit designed.

The digital design process utilizes specialized computer software for quick and efficient implementation. These tools are called CAD or Computer Aided Design tool. The different manufacturers of CAD tools were studied as many of these tools allow third party software to help in the design process. The main CAD tool used is the Xilinx ISE Design Suite and this exercise seeks to familiarize the user with the concepts of the digital design process, understand the architecture of the FPGA, specifically Xilinx's Spartan 3E which is the heart of the Digilent module breadboard supplied and utilize the various software packages to implement various circuit designs. Tasks also included learning the architecture of the training kit, how to program and implement a function on the kit, achieved by studying the Spartan 3E user guide.

Various digital circuits were tested using VHDL programming code provided by the group programmer to input into ISE design suite project navigator program. Within the design suite the code is tested for compatibility, after which it is configured to utilize specific I/O's on the board. Once the VHDL code is successfully compiled into a bit file it is downloaded into the program's memory. The circuit is then