

Curriculum Framework – Digital Electronics (2015-2016)

Unit 2 Combinational Logic – Lesson 2.4 Introduction to Programmable Logic Devices

Desired Results <i>(stage 1)</i>		
<p>ESTABLISHED GOALS <i>It is expected that students will...</i></p> <ul style="list-style-type: none"> G1 – Demonstrate an ability to identify, formulate, and solve engineering problems. G2 – Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data. G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering. G5 – Demonstrate an ability to use the techniques, skills, and 	Transfer	
	<p>TRANSFER: <i>Students will be able to independently use their learning to ...</i></p> <ul style="list-style-type: none"> T1 – Describe and demonstrate how programmable logic devices (PLDs) are used in industry to design larger circuits that would be difficult or time consuming to breadboard. 	
	Meaning	
	<p>UNDERSTANDINGS: <i>Students will understand that ...</i></p> <ul style="list-style-type: none"> U1 – Engineers and technicians use Circuit Design Software to enter and synthesize digital designs into programmable logic devices. U2 – Programmable Logic Devices can be used to implement combinational logic circuits. U3 – Circuits implemented with programmable logic devices require significantly less wiring than discrete logic, but they typically require a dedicated printed circuit board to hold the device. U4 – Programmable logic devices can be used to implement any combinational logic circuits but are best suited for larger, more complex designs. 	<p>ESSENTIAL QUESTIONS: <i>Students will keep considering ...</i></p> <ul style="list-style-type: none"> Q1 – How is the design process impacted by use of Circuit Design Software (CDS) and Programmable Logic Devices (PLDs)? Q2 – How are programmable logic devices used to implement combinational logic circuits? Q3 – Describe the advantages and disadvantages of using a programmable logic device over discrete logic gates.

Acquisition		
<p>modern engineering tools necessary for engineering practice.</p> <ul style="list-style-type: none"> • G6 – Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. • G7 – Demonstrate an understanding of professional and ethical responsibility. • G8 – Demonstrate an ability to function on multidisciplinary teams. • G9 – Demonstrate an ability to communicate effectively. • G10 – Gain knowledge of contemporary issues. • G11 – Recognize the need for, and develop an ability to engage in life-long learning. 	<p>KNOWLEDGE: <i>Students will...</i></p> <ul style="list-style-type: none"> • K1 – Know the role Programmable Logic Devices (PLDs) play in circuit development today.U1,U2 • K2 – Know the advantages to using PLDs.U3,U4 • K3 – Know the types of Programmable Logic Devices.U2 	<p>SKILLS: <i>Students will...</i></p> <ul style="list-style-type: none"> • S1 – Design combinational logic circuits using a programmable logic device.U1,U2 • S2 – Describe the advantages and disadvantages of programmable logic devices over discrete logic gates.U3,U4 • S3 – Use Circuit Design Software (CDS) and a Digital Logic Board (DLB) to simulate and prototype combinational logic designs implemented with programmable logic. U2,U3,U4

Evidence <i>(stage 2)</i>		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
2.4.1.B Combinational Logic Design: Date of Birth	<ul style="list-style-type: none"> • Student completion of truth table for example • Essential Questions 	<ul style="list-style-type: none"> • Print out of simulated circuits • Conclusion Questions • Demonstration of completed circuit
2.4.2.A Programmable Logic Devices: PLD Mode	<ul style="list-style-type: none"> • Student demonstration of successful exported file • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions
2.4.3.B PLD Design: Date of Birth	<ul style="list-style-type: none"> • Essential Questions 	<ul style="list-style-type: none"> • Print out of simulated circuits • Conclusion Questions • Demonstration of completed circuit

Learning Plan <i>(stage 3)</i>	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
2.4.1.B Combinational Logic Design: Date of Birth	K9,S2,S3,S8,S9,S11
2.4.2.A Programmable Logic Devices: PLD Mode	K1,K2,K3,S1,S2,S3
2.4.3.B PLD Design: Date of Birth	K1,K2,K3,S1,S2,S3