

NAME: AIKPOKPODION ENOCH E.

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COURSE TITLE: DIGITAL SYSTEMS DESIGN USING VHDL

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QUESTION 1:

Define the following acronyms as they apply to digital logic circuits:

- **ASIC -Application Specific Integrated Circuits**
- **PAL- Programmable Array Logic**
- **PLA-Programmable Logic Array**
- **PLD- Programmable Logic Device**
- **CPLD- Complex Programmable Logic Device**
- **FPGA- Field-Programmable Gate Array**

QUESTION 2: How does granularity of logic block influence the performance of an FPGA?

Granularity of a logic block increases or decreases the performance of an FPGA because higher level of granularity results in lesser delay between the input and output. As the granularity of logic block increases, number of levels of logic in critical path decreases, and hence delay in critical path decreases.

QUESTION 3: Why would anyone use programmable logic devices (PLD, PAL, PLA, CPLD, FPGA, etc.) in place of traditional “hard-wired” logic such as NAND, NOR, AND, and OR gates? Are there any applications where hard-wired logic would do a better job than a programmable device?

Programmable logic devices are used in place of traditional ‘hard-wired’ logic because:

- It offers simplicity
- It is accurate
- It is cost efficient

Applications where would hard-wired logic would do better than programmable device

- In motor or controllers that deal with electricity, calculation and control of current in coils can be done easily in hard-wired logic while it is almost impossible in current chips in software which are programmable devices.
- It is used when speed is necessary and verifiable operations (for reason of safety) are necessary

QUESTION 4:

Definitely, the stored program will be nonvolatile, but it will also be read-only. This is why fuse-programmed devices are sometimes called OTP which is an acronym for one time programmable and by definition this memory is a special type of non-volatile memory (NVM) that permits data to be written to memory only once. Once the memory has been programmed, it retains its value upon loss of power. OTP memory is used in applications where reliable and repeatable reading of data is required.

QUESTION 5:

