

**Khalifa University of Science, Technology and Research**

**Electronic Engineering Department**

**Microprocessor Systems Laboratory**

**ELCE332**

**Pre-Laboratory Experiment No. 3**

**HCS12 INPUT AND OUTPUT PORTS**

**Laboratory Partners**

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1. **List six of the Dragon12-Plus board features.**

* Temperature sensor for home automation applications
* 16X2 LCD display module with LED backlight and it can be replaced by any size of LCD display module via a 16 pin cable assembly
* Includes a hardware test program that simultaneously scans the keypad, plays a song, multiplexes the 4 LED seven segment display, changes display brightness by adjusting the trimmer pot and detects an object by using IR transceiver as a proximity sensor
* 16-channel 10-bit A/D converter
* BDM-in connector to be connected with a BDM from multiple vendors for debugging.
* Abort switch for stopping program when program is hung in a dead loop

1. **Open the mc9s12dg256.inc under your includes directory and list the port address of the Ports B,J,P and H**

Port A Register; 0x00000000

Port B Register; 0x00000001

Port H I/O Register; 0x00000260

Port H Input Register; 0x00000261

Port H Data Direction Register; 0x00000262

Port H Reduced Drive Register; 0x00000263

Port H Pull Device Enable Register; 0x00000264

Port H Polarity Select Register; 0x00000265

Port H Interrupt Enable Register; 0x00000266

Port H Interrupt Flag Register; 0x00000267

Port J I/O Register; 0x00000268

Port J Input Register; 0x00000269

Port J Data Direction Register; 0x0000026A

Port J Reduced Drive Register; 0x0000026B

Port J Pull Device Enable Register; 0x0000026C

Port J Polarity Select Register; 0x0000026D

Port J Interrupt Enable Register; 0x0000026E

Port J Interrupt Flag Register; 0x0000026F

Port P I/O Register; 0x00000258

Port P Input Register; 0x00000259

Port P Data Direction Register; 0x0000025A

Port P Reduced Drive Register; 0x0000025B

Port P Pull Device Enable Register; 0x0000025C

Port P Polarity Select Register; 0x0000025D

Port P Interrupt Enable Register; 0x0000025E

Port P Interrupt Flag Register; 0x0000025F

1. **Consider the code given below, how many cycles (single step execution) will it take to execute this program? How long will this take on the Dragon Plus Trainer board?**

ldab #100

loop1: ldx #10000

loop2: dex

bne loop2

decb

bne loop1

The total number of cycles is 4000401 cycles