M.Sc. Physics Semester 3 Examination

Phys E-301 Microcontrollers

Paper Code: 4706

Time 2Hours 30Min Dec. 2016 Max Marks: 70

Use proper and extensive comments to explain the logic in all programs / sketches.

1.(a) Compare any two of the Arduino types. [7]

(b) Which trigonometric functions are available to Arduino programmer? Give some examples. [7]

OR

1.(a) Explain any four data types in Arduino. [7]

(b) Describe the digital and analog inputs of Arduno. What are PWM pins?How is an analog voltage measured by Arduino? What is needed to be taken care if the voltage exceeds the analog input limit? [7]

2(a) Which typical detectors can be used to measure intensity of light? With a circuit show it connected to Arduino. Write a sketch to measure the intensity and correspondingly vary the blink rate of a connected LED . [7]

(b) How is vibration detected electronically? Write an Arduino sketch to detect knocking on the door. [7]

OR

2.(a) Explain the working principle of a Passive IR sensor. How is it connected to an Arduino, explain with a circuit and write a sketch to detect motion. [7]

(b) How does an ultrasonic sensor measure distance? Write a sketch to display the distance measured on serial terminal and also draw the connection diagram for the ultrasonic sensor with Arduino. [7]

3.(a) What is a rotary encoder ? Show its connections with arduino. Write a sketch to measure the direction and steps of rotation. [7]

(b) Which device / sensor is suitable for measuring temperature upto 100 deg C? Showing its circuit with arduino write sketch to measure and display temperature. [7]

OR

3.(a) Write a sketch to control the brightness of three LEDs connected to PWM pins of Arduino first increasing from zero to maximum brightness and then decreasing back to zero brightness. Keep a delay of 500mS between each step change. [7]

(b) Explain the use of a analog panel meter as display with arduino. Use necessary circuit diagram and appropriate arduino instructions. [7]

4.(a) Using tone() method write a sketch to produce a tone of 1000Hz for 500 ms on an appropriate pin of arduino. Which arduino pins are suitable for the tone output? [7]

(b) Draw a circuit to indicate the connection of two servos to an Arduino. Move both the servos continuously in synchronization beteen 0 and 75 degrees back and forth. [7]

OR

4.(a) Show the connections of a 2X16 text LCD with Arduino and write the sketch for displaying "Hello World" message on the display on line 2 at 5th column. [7]

(b) Explain the method of creating custom characters on a LCD . With a sketch show the process for displaying two different patterns. [7]

5.(a) Using Arduino create a simple clock and display its output on serial port, explain it using a sketch. [7]

(b) What is the use of pulsein() function in Arduino? Using it explain one application. [7]

OR

5.(a) Explain SPI mode of communication. [4]

(b) Showing the connections explain the communication between two arduinos with a sample sketch. [10]