

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

- 1.(a) What are the major differences between standard Arduino and Arduino Mega? [7]
- (b) Describe the bit operators in Arduino. [7]

OR

- 1.(a) Explain Constrain and map functions. [7]
- (b) How is serial communication setup and used in Arduino? Which function is used to receive a character serially? What is the need for Serial.available()? [7]
- 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) What is a rotary encoder ? Show its connections with arduino. Write a sketch to measure the direction and steps of rotation. [7]

OR

- 2.(a) Explain the basic principle of distance measurement using ultrasonic sensor . Write a sketch to measure and display the distance using a standard ultrasonic sensor. What is the typical accuracy for such sensors? [7]
- (b) 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]
- 3.(a) How is vibration detected electronically? Write an Arduino sketch to detect knocking on the door. [7]
- (b) An LM35 sensor is used to measure temperature of surroundings. Write a sketch to convert its output to proper temperature and display it on serial terminal. [7]

OR

- 3.(a) Draw a circuit showing the method of driving a higher power LED with Arduino outputs. Explain it. [7]
- (b) With a circuit diagram explain the connections of a 7 segment LED with Arduino. Explain how a number is displayed on it. Write part of sketch to implement the logic of display. [7]
- 4.(a) Assuming the wiper of a 10K Ohm pot connected to A0 with its two ends going to +5V and Ground, and a speaker connected to D9 of Arduino through a divider, write a sketch to control the tone at Speaker depending on the voltage on A0. [7]
- (b) Show the connections of a servo motor with Arduino. Write a sketch to move servo in the following sequence: Move 180 degrees, move to 90 deg, move to 45 deg and move to 0 deg, with a delay of 1 sec between steps. [7]

OR

- 4.(a) How are special symbols displayed on text LCD? Explain with a sketch for Arduino to display temperature. ( degree symbol code = 0xCF) [7]
- (b) A Text LCD is connected to Arduino as D4 pin of LCD to digital 10 of Arduino , D5 to 9, D6 to 8, D7 to 7, RS to 4 and E to 3. Write sketch to update display once every second (use millis() ). [7]
- 5.(a) Show the connections of a Real Time Clock using I2C, with Arduino and write a sketch to read and display time on serial port. [7]
- (b) Explain the logic of measuring duration of an input pulse using Arduino. How its accuracy can be increased? [7]

OR

- 5.(a) Explain I2C mode of communication. What is the need for port expander? [6]
- (b) With a diagram explain the multidigit seven segment display driven by arduino using SPI, with a sample sketch. [8]