



P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Fifth Semester, B.E. - Electronics and Commutation Engineering
Semester End Examination; February / March - 2022
Embedded Systems and IOT

Time: 2 hrs

Max. Marks: 50

Course Outcomes*The Students will be able to:**CO1: Understand the concepts of Programming in C and Embedded C.**CO2: Analyze the implementations of Embedded Processors (Arduino) with different peripherals.**CO3: Illustrate the Embedded Systems (Arduino Microcontrollers) for simple automations.**CO4: Explore and understand modern tools both hardware and software used with Embedded Technology and IOT.**CO5: Develop the capability to learn on your own individually and in group to explore advanced technologies in Embedded system and IOT.***Note: All questions are compulsory and each question carries TWO marks.**

Q. No.	Questions	BLs	COs	POs
1.	Which is the microcontroller used in Arduino UNO? a) ATmega328 b) ATmega2560 c) ATmega32114 d) AT91SAM3x8E	L2	CO1	PO1,3
2.	Photo Transistor (YG1006) is sensitive to Infrared Radiation in the wavelength range of a) 760nm to 1100nm c) 1400 nm to 3000 nm b) 700 nm to 1400 nm d) 760 nm to 1000nm	L2	CO1	PO1,3
3.	How many analog and digital pins are there on the arduino UNO board? a) 14,6 b) 12,6 c) 6, 14 d) 6,12	L2	CO1	PO1,3
4.	In 16x2 LCD Display, Each of the rectangle grid(Each Character) Consists of _____ pixels a) 5x8 b) 6x14 c) 8x4 d) 5x12	L2	CO1	PO1,3
5.	An embedded system hardware can a) have microprocessor or microcontroller or single purpose processor b) have digital signal processor c) one or several microprocessor or microcontroller or digital signal processor or single purpose processors d) not have single purpose processor	L2	CO1	PO1,3
6.	What is the index of the letter 'F' in this array? char text Message[] = "Have Fun"; a) 4 b) 5 c) 6 d) 0	L3	CO2	PO1,2,3
7.	What the pulse ranging it will accept to move the servo shaft through the full 180 degrees of its travel. a) Pulses ranging between 1ms and 2ms b) Pulses ranging between 10ms and 20ms c) Pulses ranging between 1ms and 5ms d) None of the above	L3	CO2	PO1,2,3
8.	Which of the following digital pins can be used in Arduino Nano/Uno to give interrupt? a) D2 c) D4,2D5 b) D62 d) D2, D3	L4	CO2	PO1,2,3

Contd... 2

9. For a servo motor to run, the three pins required of the Arduino Uno are:
- | | | | | |
|---------------------|----------------------|----|-----|---------|
| a) Vcc, GND, PWM | c) Vcc, PWM, Digital | L2 | CO2 | PO1,2,3 |
| b) Vcc, GND, Analog | d) Vcc, GND, Digital | | | |
10. What happens when the sequence 1 1 1 is fed to the L298N driver IN1, IN2 and ENA pins respectively?
- | | | | | |
|---------------------------------|--------------------------|----|-----|---------|
| a) Clockwise Motor Rotation | c) Stops Motor Rotation | L4 | CO2 | PO1,2,3 |
| b) Anticlockwise Motor Rotation | d) Stalls Motor Rotation | | | |
11. In Common cathode 7- Segment Display, To Display 6 what should be the value of a, b, c, d, e, f, g
- | | | | | |
|------------|------------|----|-----|-------|
| a) 1101101 | c) 0100100 | L4 | CO3 | PO1,3 |
| b) 1011111 | d) 0010010 | | | |
12. In 16x2 LCD Display, To Generate the Heart shape Custom Character. The initialization of pixel value is
- | | | | | |
|---|--|----|-----|-------|
| a) byte H [8] = { 0b00000, 0b01010, 0b11111, 0b11111, 0b01110, 0b00100, 0b00000, 0b00000 }; | | | | |
| b) byte H[8] = { 0b00100, 0b01110, 0b01110, 0b01110, 0b11111, 0b00000, 0b00100, 0b00000 }; | | L4 | CO3 | PO1,3 |
| c) byte H[8] = { 0b11111, 0b10101, 0b11111, 0b11111, 0b01110, 0b01010, 0b11011, 0b00000 }; | | | | |
| d) byte H[8] = { 0b00000, 0b00001, 0b00011, 0b10110, 0b11100, 0b01000, 0b00000, 0b00000 }; | | | | |
13. What should be the value of A and B to Light Led with 30% duty cycle?
- ```
void setup() {
 pinMode(13, OUTPUT);
}
void loop() {
 digitalWrite(13, HIGH);
 delay(A);
 digitalWrite(13, LOW);
 delay(B); }
```
- |               |               |    |     |       |
|---------------|---------------|----|-----|-------|
| a) A=24, B=56 | c) A=32, B=48 | L4 | CO3 | PO1,3 |
| b) A=40, B=55 | d) A=40, B=40 |    |     |       |
14. In the following code in order to generate the fade in of LED. What should be the for loop Initialization
- ```
//Initializing LED Pin
int led_pin = 6;
void setup()
{
  //Declaring LED pin as output
  pinMode(led_pin, OUTPUT);
}
void loop()
{
  for( ? ; ? ; ? ) //L1
  {
    analogWrite(led_pin, i);
    delay(5); } }
```
- | | | | | |
|----------------------------|----------------------------|----|-----|-------|
| a) L1: for(i=0;i<255;i++), | c) L1: for(i=255;i<0;i++), | L4 | CO3 | PO1,3 |
| b) L1: for(i=0;i<128;i--), | d) None of the above | | | |

15. In the following code, in order to generate the to and fro movement of 90 degree in servo motor. What should be the for loop initialization

```
#include <Servo.h>
int servoPin = 9;
Servo servo;
int angle = 0; // servo position in degrees
void setup()
{
  servo.attach(servoPin);
}
void loop()
{
  for(angle = ?; angle < ?; angle++) // L1
  {
    servo.write(angle);
    delay(15);
  }
  for(angle = 180; angle > 0; angle--) // L2
  {
    servo.write(angle);
    delay(15);
  }
}
```

L4 CO3 PO1,3

- a) L1 :for(angle = 90; angle < 0; angle++), L2: for(angle = 90; angle > 60; angle--)
- b) L1 :for(angle = 0; angle < 90; angle++), L2: for(angle = 90; angle > 0; angle--)
- c) L1 :for(angle = 120; angle < 340; angle++), L2: for(angle = 120; angle > 0; angle--)
- d) None of the above

16. What will be the correct syntax to make a digital pin (say D2) as an output pin?

- a) pinMode(2,output) b) pinMode(2,Output)
- c) pinMode(2,OUTPUT) d) pinmode(2,OUTPUT)

L2 CO4 PO1,2,5

17. A function is a series of programming statements that can be called by name. Which command is called once when the program starts:

- a) loop() c) (output)
- b) setup() d) (input)

L2 CO4 PO1,2,5

18. In 16x2 LCD Display, Command used to create a new character is

- a) lcd.createChar(); c) lcd.charcreate()
- b) lcd.cursor() d) lcd.Charcreate()

L2 CO4 PO1,2,5

19. How long the LED is on?

```
void loop() {
  digitalWrite(13, LOW);
  delay(1000);
  digitalWrite(13, HIGH);
  delay(1000);
  digitalWrite(13, LOW);
  delay(2000); }
```

L3 CO4 PO1,2,5

- a) 3 seconds c)1 second
- b) 100 seconds d)100 milliseconds

20. In Arduino Programming Instruction `attachInterrupt(A, B, C);`
What does the arguments A, B, C stands for
- a) A= Interrupt Pin, B= Interrupt Service Routine, C= Mode L3 CO4 PO1,2,5
 b) A= Interrupt Service Routine, B= Interrupt Pin, C= triggering
 c) A= Interrupt Service Routine, B= Interrupt Pin, C= Mode
 d) A= Interrupt Service Routine, B= Mode, C= Interrupt Pin
21. Suppose we have an object in front of the HC-SR04 Ultrasonic at an unknown distance and we received a pulse of width 250 μ S on the Echo pin. Calculate how far the object from the sensor is L3 CO5 PO9,12
- a) 8.5 cm c) 8.8 cm
 b) 4.25 cm d) 5.25 cm
22. If 1 means an object is detected and 0 meaning no object is detected, then considering the sensor is stationary, what can be said about the movement of the object if the output by the sensor is 1010101? L4 CO5 PO9,12
- a) Object is stationary
 b) Object is oscillating side by side
 c) Object is continuously moving away
 d) Object is continuously moving closer
23. If the PPM concentration of a gas that is being detected by the MQ2 Gas Sensor decreases what will happen to its Analog Output pin? L4 CO5 PO9,12
- a) Voltage Increases c) Voltage becomes 0
 b) Voltage Decreases d) Voltage doesn't change
24. What is the output of following program? L4 CO5 PO9,12
- ```
include <stdio.h>
void fun(int x) {
 x = 30; }
int main() {
 int y = 20;
 fun(y);
 printf("%d", y);
 return 0; }
```
- a) 30 c) Compile error  
 b) 20 d) Runtime error
25. What is the frequency of led oscillating in following code L3 CO5 PO9,12
- ```
void loop() {
    digitalWrite(13, HIGH);
    delay(1000);
    digitalWrite(13, LOW);
    delay(2000);
    digitalWrite(13, HIGH);
    delay(2000); }
```
- a) 2Hz c) 200Hz
 b) 20Hz d) 2000Hz