Reg. No.															

B.Tech. DEGREE EXAMINATION, JUNE 2024
Fifth & Sixth Semester

18ECO108J – EMBEDDED SYSTEM DESIGN USING ARDUINO
(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
1. Arduino IDE consists of 2 functions they are _____ (A) Build ( ) and Loop ( ) (B) Setup ( ) and Build ( ) (C) Setup ( ) and loop ( ) (D) Loop ( ), build ( ) and setup ( )	1	1	1	1
2. How many 16 bit general purpose register are there in ATMEGA 320 P? (A) 1 (B) 2 (C) 3 (D) 4	1	1	1	1
3. During 'CALL' instruction the stack pointer (A) Increments by 1 (B) Increments by 2 (C) Decrements by 1 (D) Decrements by 2	1	1	1	1
4. The _____ mode stops the CPU while allowing the SRAM, timer/counters, USART, 2-wire serial interface, SPI port, and interrupt system to continue functioning. (A) Idle (B) Power-down (C) Power-save (D) Standby	1	1	1	1
5. $j = 7 + k * 4$; where K=5 and the asterisk (*) is the multiplication operator. The correct answer for j is (A) 27 (B) 48 (C) 16 (D) 32	1	2	2	3

6. Identify the statement given below
If (expression 1 is logic true)
{
//execute this if statement block is true
}
//statements following the if statement block
(A) an if (b) if else
(C) cascading if (D) switch case
	1	1	2	3

7. Consider the following code fragment
int C=5;
int k;
K = – – C;
what is the value of K and C?
(A) 4, 5 (B) 5, 4
(C) 4, 4 (D) 5, 5

1 2 2 3

8. The statement:
ptr = buffer;
Simply initialized ptr to point to buffer. That is it, copies the _____of buffer into the _____of the ptr.
(A) *l value, r value* (B) *r value, l value*
(C) *l value, l value* (D) *r value, r value*

1 1 2 3

9. In parallel communication, to transmit 8-bit data with clock signal, _____wires are used.
(A) 8 (B) 9
(C) 10 (D) 11

1 1 3 5

10. Arduino boards have _____PWM pins these are PPIN no _____
(A) 6; A0, A1, A2, A3, A4, A5 (B) 4; 3, 5, 9, 11
(C) 6; 3, 5, 6, 9, 10, 11 (D) 4; PWMO, PWM1, PWM2, PWM3

1 1 3 5

11. void setup ( ) {
static byte PWM =0;
{
Void loop ( ) {
Analog write (11, PWM);
Delay (10);
PWM ++;
}
The above code is for
(A) Fading the LED using PWM (B) Check PWM
(C) Check delay (D) Check digital write

1 2 3 5

12. In SPI, MOSI line is
(A) Master output/slave output (B) Master input/slave output
(C) Master output/slave input (D) Master input/ slave input

1 1 3 5

13. If the pin is configured as an _____writing a _____value with digital write ( ) will enable an internal 20 k pull up resister.
(A) Input, high (B) Input, low
(C) Output, low (D) Output, high

1 1 4 2

14. _____are the analog-digital control and status registers.
(A) ADATE and ADIF (B) ACME and ADIF
(C) ADCSRA and ADCSRB (D) ACME and ADATE

1 1 4 2

15. In ADMUX register, if the bits REFS 1-0 are 00, then _____is selected as analog reference voltage. 1 1 4 2

(A) Internal 1.1 volt (B) AVCC
(C) AREF pin (D) Reserved

16. The Waveform Generation Mode (WGM) bits are positioned in _____bits of _____register. 1 1 4 2

(A) 2-0, TCCR2A (B) 2-0, TCCR2B
(C) 1-0, TCCR2A and 3, TCCR2B (D) 1-0, TCCR2B and 3, TCCR2A

17. IEEE 802.15.4 standard is for 1 1 5 3

(A) USB (B) Bluetooth
(C) Zigbee (D) WiFi

18. RFID can _____over standard barcode technology by reading multiple tags at once. 1 1 5 3

(A) Increase efficiency (B) Decrease efficiency
(C) Increase power (D) Decrease power

19. GPS stands for 1 1 5 3

(A) Global power system (B) Global power source
(C) Global positioning system (D) Global positioning source

20. To calculate your_____position (latitude and longitude) and track movement, a GPS receiver must be locked on to the signal of at least _____satellites. 1 1 5 3

(A) 1-D, 2 (B) 2-D, 3
(C) 1-D, 3 (D) 2-D, 2

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

	Marks	BL	CO	PO
21. Show the format of status register and examine.	4	2	1	1
22. Enumerate the registers related to timer and describe.	4	2	1	1
23. List the three general rules for naming variables or functions in C. Explain with examples.	4	2	2	3
24. Give the anatomy of a functions and explain.	4	2	2	3
25. Test an RS-232 to TTL adaptor circuit with a code.	4	3	3	5
26. Can we use digital pin 13 as either input or output? Justify your answer.	4	3	4	2
27. What is the purpose of H-bridge in interfacing a DC motor with Arduino?	4	3	5	3

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Elucidate the architecture of ATmegas 328 P with neat diagram.	12	3	1	1
	(OR)				
b.	Design a circuit to control the brightness of the LED which is connected in any of the PWM pin. Write the sketch for the same.	12	3	1	1
29. a.	Explain the following (i) Structures (ii) Unions (iii) Data storage	12	2	2	3
	(OR)				
b.i.	List the five program steps and explain with an examples.	6	3	2	3
ii.	Give the syntax of switch statement. With an example explain it.	6	3	2	3
30. a.	Execute the I^2C communication. With a code for the Arduino slave device.	12	3	3	5
	(OR)				
b.	Apply the functions and statement to write a code to control LED using an IR sensor and a remote (Arduino) and explain with circuit arrangement.	12	3	3	5
31. a.	How normal mode in set in timer? Explain with code.	12	3	4	2
	(OR)				
b.	In CTC mode how internal interrupt is initiated? Explain with code.	12	3	4	2
32. a.	Design a software model to indicate the temperature in "Red", "Yellow", 'Green" LEDs and also send the value to terminal in PC via serial port. Note: Red LED shoud glow when temperature is greater than 150 degree Celsius. Yellow LED should glow when temperature is greater than 100 degree celsius and less than 150 degree celsius.	12	3	5	3
	(OR)				
b.	Execute the interfacing of a servometer using PWM signals and controlling speed and direction with a code.	12	3	5	3

* * * * *