b.	With neat diagram explain the steps in SPI data transmission. Draw the different methods of multiple slave connection with master.	12	3	3	4
31. a.	Describe all Timer modes in Timer 0.	12	3	4	1
	(OR)				
b.	Sketch a code for Arduino Uno to blink the LED connected to GPIO with 75% duty cycle and total time period of 1000ms.	12	4	4	1
32. a.	An LCD display and a GPS module were connected to Arduino Uno. Write a Arduino – C program to get the GPS coordinator and display in the LCD. Also explain the working of GPS with suitable diagrams.	12	4	5	4
	(OR)				
b.	Draw and explain the Inter-facing diagram to connect Bluetooth with Arduino and write a program.	12	4	5	4

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Reg. No.														

B.Tech. DEGREE EXAMINATION, JUNE 2023

Fifth and 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

	Marks	BL	CO	PO

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. Arduino IDE consists of two functions. What are they? — 1 1 1 1

   (A) Build( ) and loop( ) (B) Setup( ) and build( )
   (C) Setup( ) and loop( ) (D) Loop( ) and build( ) and setup( )

2. The global interrupt enable bit _____should be set for enabling all the _____ — 1 1 1 1

   (A) 6, interrupt service routine (B) 5, interrupt flags
   (C) 7, interrupts (D) 4, interrupts

3. In Arduino UNO, when the serial port is not communicating with any of the applications, the receiver and transmitter pins can be used as _____ — 1 2 1 1

   (A) Special function register (B) General purpose I/O lines
   (C) Control console for diagnostics (D) Console for configurations

4. In ATmega 32, the serial communication on the transmitter and receiver pin uses _____logic levels. — 1 3 1 1

   (A) TTL(Transistor-Transistor logic) (B) ECL(Emitter Coupled Logic)
   (C) CMOS (D) ECL and CMOS

5. In Arduino C, the highest precision you can expect for a floating-point value is _____digits of precision. — 1 1 2 2

   (A) Five (B) Six
   (C) Seven (D) Eight

6. All pointer variables are designed to hold _____ — 1 1 2 2

   (A) Either an lvalue, or an rvalue (B) An rvalue, not an lvalue
   (C) An lvalue, not an rvalue (D) Any valve

7. _____is used in the pointer definition to inform the compiler that this is a pointer variable rather than a regular data type. — 1 1 2 2

   (A) The keyword int (B) The asterisk
   (C) The keyword long (D) &

8. $j = 5 + k^*2$; where K=4 and the asterisk (*) is the multiplication operator. The correct answer for j is — 1 2 2 2
   (A) 13 (B) 18
   (C) 26 (D) 36

9. In communication system, transmitter which converts _____ such as sound, words, pictures etc, into corresponding_____ — 1 2 3 1
   (A) Physical message, scaled physical message (B) Physical message, electric signal
   (C) Electric signal, physical message (D) Electrical signal, scaled electrical signal

10. Which statement is used to send out an analog data in IO pin using Arduino IDE? — 1 3 3 5
   (A) analogRead(Pin); (B) analogWrite(Pin);
   (C) analogReference(type); (D) analogWrite(pin, value)

11. Sending data over I^2C involves three functions. one of them is — 1 1 3 1
   (A) wire.begin transmission ( ) (B) wire.request from( )
   (C) Wire.available ( ) (D) Wire.read( )

12. The function sets the serial communication speed is — 1 2 3 1
   (A) Serial.begin(speed) (B) Serial.read( )
   (C) Serial. Write(VAL) (D) Serial.println(val, format)

13. To read a signal on an external pin of an Arduino board, write a _____ to the data direction bit_____. — 1 1 4 12
   (A) Logic high, DDXn (B) Logic low, DDXn
   (C) Logic low, PORTXn (D) Logic high, PORTXn

14. The analogRead (pin) function returns _____ — 1 1 4 12
   (A) Logic high (B) Logic low
   (C) int(0 to 1023) (D) int(0 to 255)

15. The Waveform Generation Mode (WGM) bits are positioned in _____bits of _____register. — 1 2 4 12
   (A) 2-0,TCCR2A (B) 2-0, TCCR2B
   (C) 1-0, TCCR2A and 3, TCCR2B (D) 1-0, TCCR2B and TCCR2A

16. What is the use of pin change interrupts? — 1 1 4 12
   (A) To change pins during interrupts (B) To use more pins for interrupts
   (C) To disable pin usage during interrupts (D) To enable pin usage during interrupts

17. The RFID reader has 4 terminals they are — 1 2 5 5
   (A) Enable, OUT, +5, –5 (B) Enable, OUT, +5, Gnd
   (C) Trigger, OUT, +5, Gnd (D) Enable, IN, +5, Gnd

18. Infrared light is _____radiation with wavelengths _____than those of visible light. — 1 1 5 5
   (A) Magnetic, longer (B) Electromagnetic, longer
   (C) Electromagnetic, shorter (D) Magnetic, shorter

19. How many bits does access code have in Bluetooth frame format? — 1 2 5 4
   (A) 64 bits (B) 72 bits
   (C) 128 bits (D) 1024 bits

20. NEO-6M is a _____chip. — 1 1 5 4
   (A) RFID (B) Bluetooth
   (C) GPS (D) Zigbee

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

	Marks	BL	CO	PO
21. Explain the memory organization of various ATmega IC's.	4	2	1	1
22. Write a short notes on I/O port in Arduino.	4	2	2	2
23. Draw an RS-232 to TTL receiver circuit and explain.	4	2	3	5
24. Write a note on clock prescalar in Timer/Counter 2.	4	2	3	5
25. Explain the functions analog Read( ) and analog write( ).	4	2	4	5
26. List the registers associated with the APC system. Explain any one.	4	2	4	5
27. Write a note on GPS Navigation.	4	2	5	2

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
28. a. With suitable waveform diagram and formula for duty cycle, explain the operation of PWM. And write a simple Arduino sketch to glow a LED connected at Pin 13 at 60% duty cycle.	12	3	1	1
(OR)				
b. Explain in detail about the steps involved in writing, saving, compiling with Arduino IDE.	12	3	1	1
29. a. Write on Arduino – C program to access a table using		3	2	2
i. 2- dimensional array	6			
ii. Pointers	6			
(OR)				
b. Describe the five steps involved in programming in detail with suitable example.	12	3	2	2
30. a. Explain I2C protocol in detail with appropriate timing diagram.	12	3	3	4
(OR)				