

Semester: VI

Section: A & B

Maximum Marks: 20

Date : 06.04.2022

Duration: 1 Hour

Time: 10.00 am to 11.00 am

### ANSWER ALL THE QUESTIONS

*Note: Some MCQs may have multiple answers. In such cases, you are expected to write all the correct choices. Otherwise, no mark will be provided for that question.*

1. Match the following ( $4 \times 0.25 = 1$  Mark)

- A. M37267M8 Microcontroller - 1. Auto vectored interrupt scheme     3, 1, 4, 2  
B. Non vectored interrupt - 2. Synchronous serial transmission     ~~3, 2~~  
C. I/O Bus - 3. Internal circuitry for Interrupt transactions  
D. Serial peripheral interface - 4. Interrupt request control signals

2. The parallel communication interface is responsible for \_\_\_\_\_ of receiving data being transmitted from the master CPU onto the parallel port pins and \_\_\_\_\_ of data bits transmitted from the Input device. ( $2 \times 0.5 = 1$  Mark)     Encoding , Decoding .

3. Find odd one out in terms of Board Buses. (1 Mark)

- A. Personal Computer Memory Card International Association Bus interface  
B. Non Expandable Integrated Drive Electronics (IDE) Bus  
☒ C. Versa Modular Eurocard (VME) Bus  
D. Small Computer System Interface Bus

4. \_\_\_\_\_ form the following(s) is/are true about the embedded hardware building blocks? (1 Mark)

- A. Dynamic central parallel arbitration is one of the bus arbitration schemes in which arbitrator are connected to all masters.  
☒ B. In synchronous data transmission, separate clocks is not used by the serial interface of transmitter and receiver circuits.  
C. In synchronous data transmission, the state of the communication channel between the transmissions of frames is being a non-return to zero.  
☒ D. In a full duplex communication scheme, the data stream can be transmitted and received in either direction simultaneously.



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5. In embedded hardware building blocks, we are the components used to provide ability to the master CPU in configuring and monitoring the I/O Controller. And the Master CPU uses us to communicate and/or control the connected I/O devices via the I/O controller. Find out who are we? (1 Mark) *control + status registers.*

6. Blocked data transferring mode (burst data transfer scheme) schemes are used in \_\_\_\_ memory transaction. (0.5 Mark) *cache.*

7. \_\_\_\_ or \_\_\_\_ is used to synchronize slower I/O devices with the high speed master CPU and \_\_\_\_ is used to synchronize I/O devices with the master CPU when the I/O devices have higher speed than the master CPU. (1.5 Marks) *interrupts, DMA status flag.*

8. The baud rate is \_\_\_\_ (1 Mark)

A. the bandwidth of the serial interface.

B. the total number of bits that can be transmitted.

☒ C. the total number of bits per unit time that can be transmitted.

D. None of the above.

9. Which of the following combination of device driver function is correct when a hardware in an inactive state. (1 Mark)

A. Hardware startup, enable, read

B. Hardware read, acquire write

C. Hardware startup, release, disable, shutdown

☒ D. Hardware startup, install, enable

10. Match the following ( $4 \times 0.25 = 1$  Mark)

A. Execution mode of device driver - 1. Hardware interrupt

B. Divide by zero trap - 2. Address of the ISR

C. Interrupt vector table - 3. Edge triggered interrupts

D. Very short or very long Interrupt signals - 4. Supervisory

*4, 1, 2, 3*

11. Identify the correct option for the given assertion and reason. (1 Mark)

**Assertion:** Device drivers are categorized in two ways. They may be either architecture-specific or generic. Though generic device driver manages hardware that is located on the board and not integrated onto the master processor, it has architecture-specific source code parts in it.

**Reason:** Because the I/O controller is the primary control unit and has access to



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everything on the board, there are usually architecture-specific parts of source code in a generic driver.

- A. Assertion and reason, both are true
- B. Assertion and reason are false
- ✓ C. Assertion is true and reason is false
- D. Assertion and reason are true, but this is not the correct reason for the given assertion

12. Consider asynchronous transmission is happening in an embedded system. Three serial interfaces are involved in the data transmission. Assume that serial interface1 works in the bit rate 512Kbps, serial interface2 has 1024Mbps bit rate and serial interface3 at 256Mbps. Find out what is the minimum data rate can be expected from this transmission (1 Mark). Justify your answer with explanation. (1 Mark)

13. Consider we have an embedded system where the serial interface at the transmitter divides the data stream into packets and encapsulated as frames with 1 start and 1 stop bit. Assume that the number of bits per character is 30. Find out the number of characters per second can be transmitted through asynchronous and synchronous serial lines with 4800bps baud rate. (2 Marks)

14. Write pseudocode for I<sup>2</sup>C buffer descriptor Initialization in the implementation of on-board bus device driver. Consider you need to initialize two reception buffer and one transmission buffer in the initialization of I<sup>2</sup>C buffer descriptor. (3 Marks)

15. With neat block diagrams (1 Mark), list down the four differences (1 Mark) between Monolithic OS and Microkernel-based OS.

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# Embedded Systems Design Model Examination – April 2022

## Instructions:

- i) Each question carries 2.5 marks
- ii) For correct answer – 1 mark and explanation/justification of answer - 1.5 marks
- iii) If a question is attempted without explanation, it won't be considered for evaluation.

**Total Marks: 50**

1. Arduino Uno programs does not have the main function like C programs  
☒ a) True  
b) False
2. What mode should we put the Arduino pin to, in order for object detection to work with the Ultrasonic Sensor?  
a) TDM  
b) PCM  
☒ c) Analog  
☒ d) Digital
3. Which sensor can be used to measure moisture and humidity?  
a) Sesimoscope  
b) Capacitive  
c) Resistive  
☒ d) Both Resistive and Capacitive
4. Function used to detect a button press on the Arduino is \_\_\_\_\_.  
☒ a) digitalWrite()  
b) analogRead()  
c) buttonPress()  
☒ d) buttonRead()
5. The core processor of the Arduino Uno has a 16 MHz crystal oscillator for the processor clock.  
☒ a) True  
b) False
6. Consider the following statements and choose the statement which is/are TRUE.  
☒ a) PWM pins mimic analog signals  
☒ b) Sensors generate analog readings that are read by the analog pins  
☒ c) Analog signals are converted using analog-to-digital converter by analog pins  
d) Analog signals are converted using a digital to analog converter by analog pins



7. In Arduino Uno, what value will be read by the ADC if the input voltage is 4V?

analog pin is 4V?

a) 0.01955

b) 0.01953

c) 0.01289

☒ d) 0.01290

8. Is it possible to read the data in SD card using any computer, if the data is written by Arduino Uno?

☒ a) True

b) False

9. What will the code given below give as output if a 5V line is connected as input to pin 11?

```
int pin_1=11;
```

```
void setup() {
```

```
  pinMode(pin_1, INPUT);
```

```
  Serial.begin(9600);
```

```
}
```

```
void loop() {
```

```
  int reading=analogRead(pin_1);
```

```
  Serial.println(reading);
```

```
}
```

☒ a) 0

b) 5

c) Null

☒ d) 1023

10. Which microcontroller is used in Arduino Uno?

a) ATmega32114

b) AT91SAM3x8E

c) ATmega2560

☒ d) ATmega328p

11. The board mbed LPC1114 board has 32 bit processor working at a clock speed of 96.

12. Light bulb can be interfaced with the Arduino boards through which pin?

☒ a) P7

b) A5

c) A7

d) P5 (PWM)

13. Touch screen devices uses which sensor?

a) Touch sensor

b) Temperature sensor

c) Humidity sensor

☒ d) Pressure sensor

14. What is the output of "pin1" if "pin2" is sent "1011" where 1 is 5V and 0 is 0V?

```
int pin1 = 12;
int pin2 = 11;
void setup() {
  pinMode(pin1, OUTPUT);
  pinMode(pin2, INPUT);
  Serial.begin(9600);
}
void loop() {
  if(digitalRead(pin2)==1) {
    digitalWrite(pin1,LOW);
  }
  else if(digitalRead(pin2)==0) {
    digitalWrite(pin1,HIGH);
  }
}
```

- a) 1110
- ☒ b) 0100
- c) 1111
- d) 1011

15. What will be the output of the following Arduino code?

```
#define X 10;
void setup(){
  X=0;
  Serial.begin(9600);
  Serial.print(X);
}
void loop(){
  //Do nothing...
}
```

- a) 0xAB
- b) 000000.....
- ☒ c) 0
- d) Error

16. Intel Galileo board operates at 3.3 V. A voltage regulator on the board enables voltage translation of 3.3V to 5V at the I/O pins. The board will not display if the voltage supplied is lesser than operating voltage.

17. Pins required to connect Arduino board to servo motor?

- ☒ a) +5V, GND, A0
- b) +5V, GND, A7
- c) +5V, GND, D8
- d) +5V, GND, D9

18. Number of data pins in an 16X2 LCD screen is

- a) 8
- b) 12
- ~~c) 16~~
- d) 32

19. How many times does the code give a digital HIGH signal at pin1?

```
int pin1=11;
int x=3;
void setup() {
  pinMode(pin1,OUTPUT);
}
void loop() {
  for(int i=x;i<6;i++) {
    if(i%2==0) {
      x=x+1;
      loop();
    }
    else {
      digitalWrite(pin1,HIGH);
      digitalWrite(pin1,LOW);
    }
  }
}
```

- a) 1
- b) 2
- c) 3
- ~~d) 4~~

20. Which pin is recommended to measure the value from current sensor in Arduino Uno?

- a) D7
- b) D10 (PWM)
- c) A0
- ~~d) None of these.~~

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CYCLE TEST II

CSPC63 Principles of Cryptography

Date: 07/04/22

Time: 60 Mins

ANSWER ALL THE QUESTIONS

MAX: 20 Marks

1. How are round keys generated in DES? Explain in detail. (4)
2. AES defines three different cipher key sizes but DES defines only one cipher key size. What are the advantages and disadvantages of AES over DES with respect to this difference? (4)
3. In RSA, given  $n = 12091$  and  $e = 13$ , encrypt the message "THIS IS EASY" using the 00 to 26 encoding scheme (00 to 25 for letters A to Z and 26 for the space). Decrypt the ciphertext to find the original message. (4)
4. With appropriate diagrams, explain the working of Diffie- Hellman key exchange algorithm. (4)
5. In Elgammal cryptosystem, given the prime  $p = 31$ ,
  - (i) Choose an appropriate  $e_1$  and  $d$ , then calculate  $e_2$  (2)
  - (ii) Encrypt the message "HELLO" using 00 to 25 for encoding. Use different blocks to make  $P < p$ . (2)

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**B.Tech. DEGREE, VI SEMESTER, II CYCLE TEST, APRIL-2022**

**CSPE64-Data Analytics**

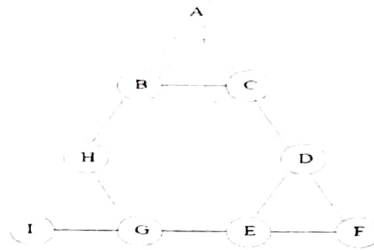
**DATE: 08-04-2022**

**TIME: 02:30 p.m. -03:30 p.m.**

**MAX.MARKS:20 Marks**

**Answer all Questions**

1. Consider the following Social Network Graph. Perform community detection using Girvan -Newman Algorithm. (4 marks)



2. Explain the different types of Graph analytics algorithmic approaches used in Social Network Analysis. (4 marks)
3. Consider the following table Market basket transaction. Find the frequent item sets using Apriori algorithm and PCY algorithm. The minimum support is 30% (6 marks)

**Table 1. Market basket transactions**

Transaction ID	Items Bought
1	{Laptop, Printer, Tablet, Headset}
2	{Printer, Monitor, Tablet}
3	{Laptop, Printer, Tablet, Headset}
4	{Laptop, Monitor, Tablet, Headset}
5	{Printer, Monitor, Tablet, Headset}
6	{Printer, Tablet, Headset}
7	{Monitor, Tablet}
8	{Laptop, Printer, Monitor}
9	{Laptop, Tablet, Headset}
10	{Printer, Tablet}

4. Assume that the number of clusters ( $k=3$ ). Use k-means clustering to cluster the following set of data: P1(0, 2), P2(5, 0), P3(7, 3), P4(0, 5), P5(3, 1), P6(5, 2), P7(1, 7), P8(6, 6). (4 marks)
5. Write short notes on the characteristics and factors of business problems in choosing Graph Analytics. (2 marks)

-----Best Wishes-----



National Institute of Technology, Tiruchirappalli - 15  
Department of Computer Science and Engineering  
CYCLE TEST 2

CSPC62 – Compiler Design

Course/Department : B.Tech./CSE

Semester/Section : VI

Date and Time : 06-04-2022 & 02.30 PM – 03.30 PM

Batch : 2019-2023

Session : Jan/2022

Marks : 20

Answer ALL Questions with proper steps and justification.  
Draw diagrams wherever necessary.

1. Construct CALR parsing table for the following grammar by using LR(1) items. Take a sample input string for the grammar and parse it using the constructed CALR parsing table. (5)  
$$\begin{aligned} E &\rightarrow E + T | T \\ T &\rightarrow T * F | F \\ F &\rightarrow (E) | id \end{aligned}$$
2. Explain quad-triples and triples representation of three-address code. Give the three-address code in quad-triples and triples representation for the following expression. Operators +, -, ^, / and \* denotes addition, unary minus, exponent, division and multiplication respectively. (3)  
$$z := (a + -b) ^ t + c ^ y / d + e * x$$
3. Generate three-address code for the following expression. Assume that, the expression is written according to the syntax of Pascal where  $X[i, j]$  is a two dimensional integer array of size  $5 \times 10$  with indices  $i$  and  $j$ ;  $a$  and  $b$  are variables. (2)  
$$X[i, j] = a + b$$
4. Generate the three-address code for the following pseudocode. Identify the basic blocks in the resultant three-address code and construct the control flow graph. (4)  

```
while (i < j) and (j < n) or (k < n) do
    c = 1
    if c < j then
        x = x + c
    else
        x = 2 * c
    c = c + 1
    j = j + 1
    k = k * 2
end
a = x + n
```
5. With the help of an example, explain Activation record and stack memory allocation. (3)
6. Write target code in assembly language (hypothetical machine: cost of all operations is the same and extra cost for operations involving memory) for the following three-address code fragment and find its cost. Assume that, none of the variables are in registers. In order to perform an arithmetic operation, at least one of the operands should be in register. Also, assume that two registers (R0 and R1) are free which can be used for computations. (3)  

```
101: y := b[i]
102: z := y / x
103: x := x * k
```