

CT#1 (SET-A)

Computer Organization and Architecture (CSTE-2209)

Time: 40 Minutes

Marks: 25

Answer the following questions:

1.	Define Moore's Law. Differentiate between computer organization and computer architecture.	2+2=4
2.	What do you mean by registers? Explain the different types of registers in details.	1+3=4
3.	Discuss the instruction cycle state diagram with an appropriate diagram.	6
4.	Show the asynchronous timing diagram for read and write operations.	5
5.	What do you mean by bus arbitration? Show the differences between centralized and distributed arbitration with appropriate diagrams.	2+4=6

CSTE 2201(OOP with Java) Session: 2020-21 Class Test-1

Answer the following questions:

Marks: 25

1. (a) What is portability? How does Java solve portability problem? 3
(b) What is **bytecode**? Explain **boolean** type with a programming example. 4
2. Find error in the following fragment of a program. What type of error will occur? 3

```
class A{  
    public static void main(String args[ ]){  
        int x=99;  
        { int x=9; },  
    }  
}
```

16 8
3. How to create a two dimensional array in which the size of the second dimension are unequal. Explain it with a programming example. 5
4. (a). Write the names of bitwise operators? 3
int a=32; a=a>>2; After applying this, What will be the value of a? 5
(b). Explain the **For-Each** version of the **for** loop with example. 17
5. What will be the output of the following fragment of the program? 2

```
int num[ ] = {10, 11, 7, 8, 9};  
for( int x : num) {  
    System.out.print(x + " ");  
    x = x * 10; }  
System.out.println( );  
for( int x : num)  
    System.out.print(x + " ");
```

CT#1 (SET-B)

Computer Organization and Architecture (CSTE-2209)

Time: 40 Minutes

Marks: 25

Answer the following questions:

1.	What do you mean by structure and function? Draw the top-down structure of a computer.	2+2=4
2.	What do you mean by interrupts? Explain the classes of interrupts in details.	1+3=4
3.	Draw the instruction cycle with interrupts. What are the approaches that can be taken to dealing with multiple interrupts? Explain with appropriate diagrams.	2+4=6
4.	Show the synchronous timing diagram for read and write operations.	5
5.	Show the multiplexed bus operations with appropriate diagrams.	6

Department of CSTE, MATH-2207

1. Distinguish between Discrete and Continuous Random Variables. 3
2. Explain the differences between Cumulative Distribution Function and Probability Mass Function. 5
3. Find the Variance of Random Variables. 2
4. Distinguish between Binomial Distribution and Poission Distribution with examples. 6
5. If three persons, on an average, come to ABC company for job interview, then find the probability that less than three people have come for interview on a given day. 4
6. A variable X is distributed at random between the values 0 and 4 and its probability density function is given by $f(x)=kx^3(4-x)^2$, Find the value of k , the mean and standard deviation of the distribution. 5

Data Communication, CSTE 2207, CT-1, Session 2020-21

1. What is pixel? What is resolution?
2. What is Circuit Switching?
3. What is TCP/IP?
4. For n devices in a network, what is the number of cable links (Full Duplex) required for a Mesh, ring, bus, and star topology?
5. What is Gateway?
6. What is Jitter?
7. What does a repeater do?
8. What are the three criteria necessary for an effective and efficient network?
9. Why Standard is needed for Data Communication?
10. A switch is a device used to segment networks into sub-networks or subnets. True/False?

1.	Why do engineers prefer to transform physical variables to electrical signals? Write down the properties of unit impulse function. Smallest positive value of time, for which signal is periodic is called——?	2+2+1
2.	What is the relation between ramp signal and unit step signal? Find the fundamental period: $x(t) = \cos t + \sin \sqrt{2}t$	2+3
3.	$x(t) = \begin{cases} 1 & t = -1, \\ 2 & t = 0, \\ 1 & t = 1, \\ 0, & \text{otherwise.} \end{cases}$ Perform $x(t/2)$	03
4.	$x(t) = \begin{cases} t+1 & -1 \leq t \leq 0, \\ 1 & 0 < t \leq 2, \\ -t+1 & 2 < t \leq 3, \\ 0, & \text{otherwise.} \end{cases}$ Perform and plot $x(3t-6)$	05
5.	Verify the property of unit impulse function: $\int_{-\infty}^{\infty} x(t) + \delta(t - t_o) = x(t_o)$ Sketch and identify the signal as energy or power or neither energy nor power signal: $x(t) = e^{-at}$ Where, $a > 0$, $a < 0$ and $a=0$	2+5

1.	With what type of signals Radar Engineer and Power Engineer deal? Write the formula and figure of even and odd signals. Smallest positive value of time, for which signal is periodic is called———?	2+2+1
2.	What is the relation between ramp signal and unit step signal? Find the fundamental period: $x(t) = \cos \frac{\pi}{3} t + \sin \frac{\pi}{4} t$	2+3
3.	$x(t) = \begin{cases} 1 & t = -1, \\ 2 & t = 0, \\ 1 & t = 1, \\ 0, & \text{otherwise.} \end{cases}$ Perform $x(3t)$	03
4.	$x(t) = \begin{cases} t+1 & -1 \leq t \leq 0, \\ 1 & 0 < t \leq 2, \\ -t+1 & 2 < t \leq 3, \\ 0, & \text{otherwise.} \end{cases}$ Perform and plot $x(3t-6)$	05
5.	Identify the signal as energy or power or neither energy nor power signal: $x(t) = t \cdot u(t)$. Calculate the integral of three signals: $\int_{-\infty}^{\infty} [\cos \pi t \delta(t-2) + 3\delta(t+1) + \sin \pi t \delta(2t-1)] dt$	2+5 $\checkmark =$ $P =$

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CSTE-2201: (OOP with Java)
Time: 45 minutes

Session: 2020-21

Test-2

Marks: 25

1. Why **static** members are declared in a class? What are the restrictions when methods are declared as **static**? 5
2. Why **super** keyword is used? Explain with a programming example. 4
3. What is the difference between method overriding and overloading? Explain. 4
4. What is dynamic method dispatch? Explain dynamic method dispatch with a programming example. 6
5. Find out the error of the following code. Explain, why? 3

```
class A{  
    final void xy( ) { System.out.println("xy"); }  
}  
class B extends A{  
    void xy( ) { System.out.println( "xy"); }  
}
```
6. Given the following hierarchy: 3

```
class Alpha { ...  
class Beta extends Alpha { ...  
Class Gamma extends Beta { ...
```

In what order do the constructors for these classes complete their execution when a **Gamma** object is instantiated?

1. (*Searching Strings*) Write an application that inputs a line of text and a search character and uses String method indexOf to determine the number of occurrences of the character in the text.
2. (*Rectangle Class*) Create a class Rectangle with attributes length and width, each of which defaults to 1. Provide methods that calculate the rectangle's perimeter and area. It has *set* and *get* methods for both length and width. The *set* methods should verify that length and width are each floating-point numbers larger than 0.0 and less than 20.0. Write a program to test class Rectangle.
3. Write an inheritance hierarchy for classes Quadrilateral, Trapezoid, Parallelogram, Rectangle and Square. Use Quadrilateral as the superclass of the hierarchy. Create and use a Point class to represent the points in each shape. Make the hierarchy as deep (i.e., as many levels) as possible. Specify the instance variables and methods for each class. The private instance variables of Quadrilateral should be the x-y coordinate pairs for the four endpoints of the Quadrilateral.

Write a program that instantiates objects of your classes and outputs each object's area (except Quadrilateral).

$\vec{B} = B_x \hat{i} + B_y \hat{j} + B_z \hat{k}$
 $\vec{E} = 0$

$\frac{d}{dt} \left(\int \vec{B} \cdot d\vec{A} \right) = - \int \vec{E} \cdot d\vec{A}$

1. From Faraday's law, derive Maxwell's equation - (4)
2. State and explain equation of continuity. (5)
3. How Maxwell Modified Amperes law (5)
4. If the magnetic field $\vec{B} = 2x\hat{i} + 5y\hat{j} + 4z\hat{k}$, find out \vec{E} . (3)
 $\vec{B} = 2t^2x\hat{i} + 5ty\hat{j} + 4tz\hat{k}$ where t is time
5. Using above, calculate $\vec{E}_x, \vec{E}_y, \vec{E}_z$ (4)
6. Write down word statement of Maxwell's four equations. (4)

Data Communication, CT-2, Session 2020-21, Total 25

1.	Write are differences between TCP/IP and UDP?	6
2.	Write the differences between OSI layer and TCP/IP protocol layers?	6
3.	What is the first principle we discussed in this chapter for protocol layering that needs to be followed to make the communication bidirectional?	6
4.	Define ARP.	2
5.	Define Encapsulation.	2
6.	Differentiate between Unicast, Multicast, and Broadcast.	3

Time: 30 minutes

1.	Explain a linear system with the necessary diagram.	05
2.	<p>Consider the system output as $y(t)$ and determine if the system is:</p> <p>i. $y(t) = x(t) + x(t-1) + x(t+1)$; static, dynamic, causal, non-causal, with memory or memory-less.</p> <p>ii. $y(t) = \sin t \cdot x(t)$; time invariant or variant</p> <p>iii. $y(t) = x^2(t)$; invertible or non-invertible</p> <p>iv. $y(t) = e^{x(t)}$ for $x(t) \leq 6$; BIBO stable or Unstable.</p>	08
3.	<p>Calculate the convolution integral of two signals:</p> <p>$x(t) = e^{-t}u(t)[u(t-1)-u(t-2)]$</p> <p>$h(t) = u(t)$</p>	06
4.	<p>Consider the differential equation of an LTI system:</p> <p>$\frac{dy(t)}{dt} + 2y(t) = x(t); y(0) = 1$</p> <p>Where $x(t) = ke^{3t}u(t)$, k is a real number.</p> <p>Calculate the output response of the system.</p>	06

CT#1 (SET-A)

Computer Organization and Architecture (CSTE-2209)

Time: 40 Minutes

Marks: 25

Answer the following questions:

1.	What do you mean by CPI? Suppose, a computer A has a clock cycle time of 250 ps and an effective CPI of 2.0 for some program and computer B has a clock cycle time of 500 ps and an effective CPI of 1.2 for the same program. Which computer is faster and by how much?	2+2=4 ✓
2.	Define Amdhal's law. Explain with an example.	4
3.	What do you mean by virtual memory? Show the differences between logical and physical caches with appropriate diagrams.	1+4=5
4.	Explain about write strategy of block replacement.	4
5.	What do you mean by microoperations? Show the hardware implementation of arithmetic microoperations.	1+7=8

CT#2 (SET-B)

Computer Organization and Architecture (CSTE-2209)

Time: 40 Minutes

Marks: 25

Answer the following questions:

1.	What do you mean by MIPS? A program runs on computer A with a 2 GHz clock in 10 seconds. What clock rate must a computer B run at to run this program in 6 seconds? Unfortunately, to accomplish this, computer B will require <u>1.2 times</u> as many clock cycles as computer A to run the program.	2+2=4
2.	Discuss about the methods of accessing unit of data.	4
3.	What are the recency based cache replacement policies? Consider a fully associative cache with 8 cache blocks (numbered 0-7) and the following sequence of memory block requests: 4,3,25,8,19,6,25,8,16,35,45,22,8,3,16,25,7. If LRU replacement policy is used, which cache block will have memory block 7?	2+3=5
4.	What are the differences between associative and set associative cache mapping with appropriate diagrams.	4
5.	Show the hardware implementation of shift microoperations. "An left arithmetic shift operation must be checked for the overflow"-why? Explain with an example.	4.5+3.5=8

CSTE 2201(OOP with Java) Session: 2020-21 Class Test-3

Answer the following questions:

Marks: 25

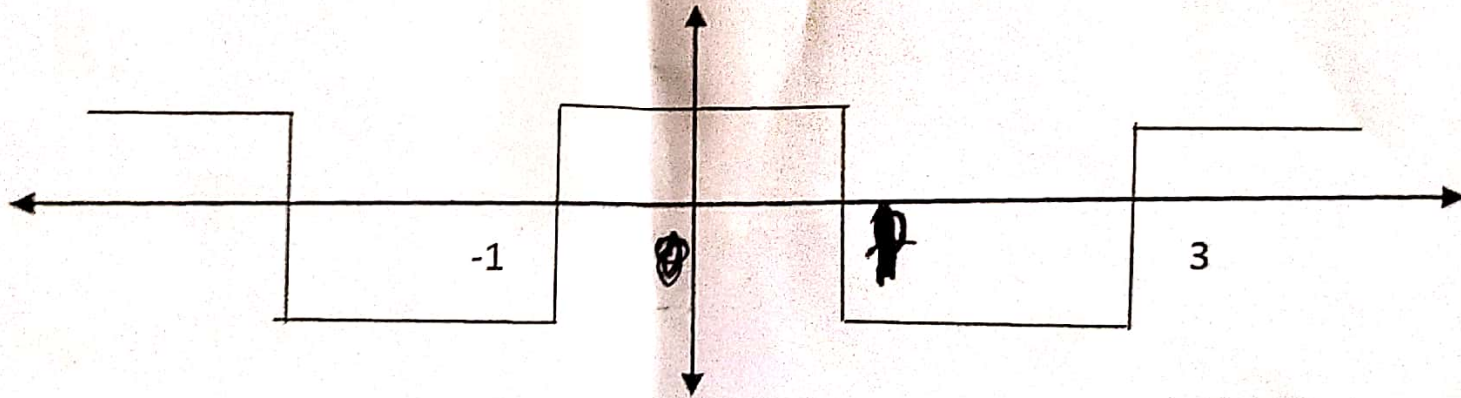
- | | | |
|-----|---|---|
| ✓1. | Explain the two ways that the members of a package can be used by other packages. | 5 |
| ✓2. | What standard Java package is automatically imported into a program? | 3 |
| 3. | Explain the difference between protected and default access. | 5 |
| ✓4. | How many classes can implement an interface? How many interfaces can a class implement? | 4 |
| ✓5. | Can interfaces be extended? Explain with a programming example. | 5 |
| ✓6. | Is it possible to define a static method in an interface? | 1 |
| ✓7. | Can an interface have a private method? | 2 |

Course Title: Signals and Systems CT-02

Course Code: CSTE-2205

Marks 25

Time: 50 minute

1.	Verify the time shifting property of Fourier transform.	03
2.	Write about three Dirichlet Conditions for the existence of Fourier Series.	06
3.	Find the Fourier Transform: $\cos \omega_0 t$	04
4.	Expand the signal into Fourier Series:	10
		
5.	Explain Distortionless Transmission	02