

DIGITAL LOGIC DESIGN AND COMPUTER ARCHITECTURE

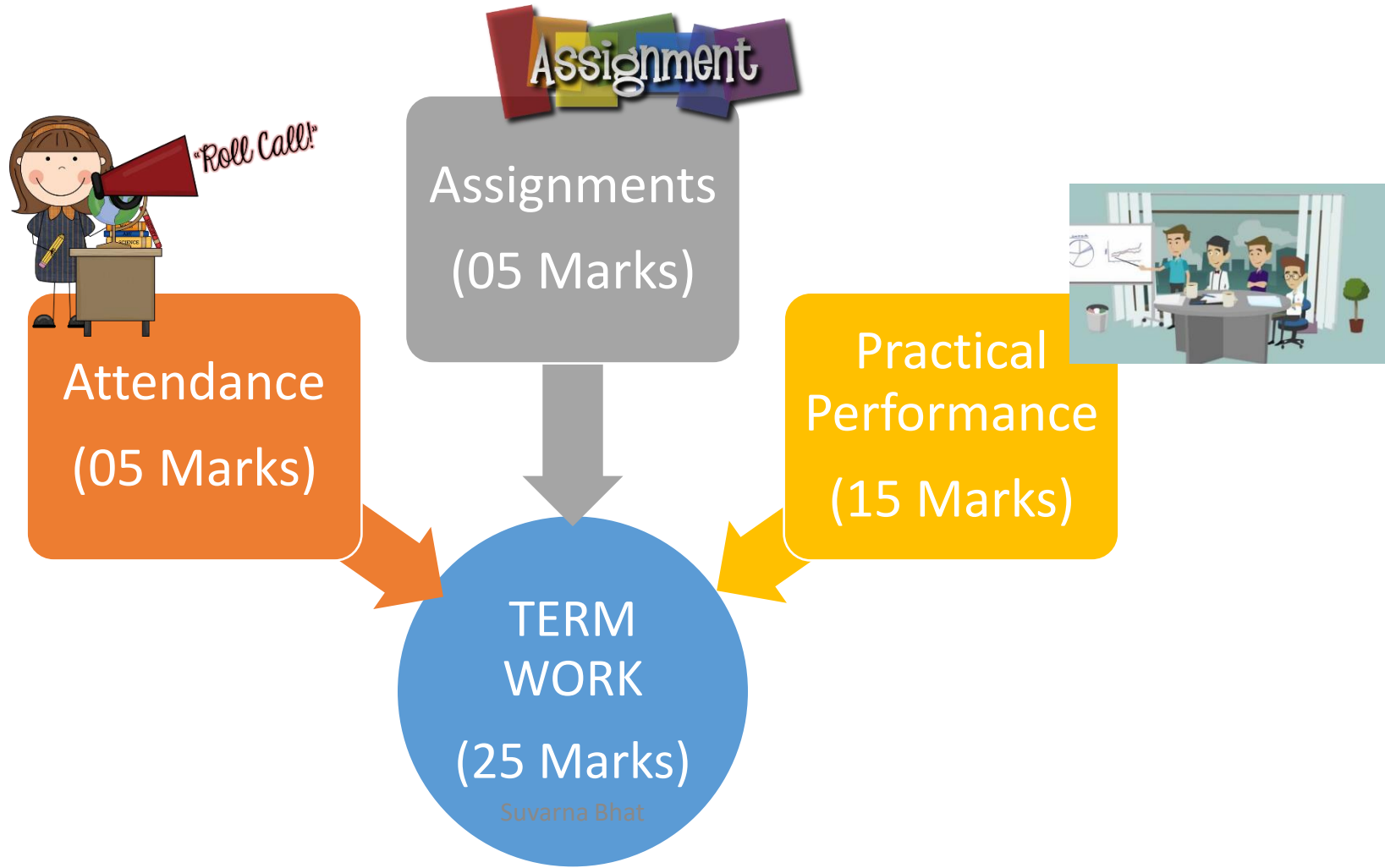
LECTURE 1

INTRODUCTION TO DIGITAL SIGNAL , DIGITAL SYSTEM & DIGITAL CIRCUITS

SYLLABUS

Module 1 : Computer Fundamentals	13	Module 4 : Control Unit Design	15
I. Number System & Codes		I. Hardwired Control Unit	
II. Logic Gates		II. Microprogrammed Control Unit	
III. Functional Block Diagram of computer system			
IV. Von Neumann Model			
Module 2 : Data Representation and Arithmetic algorithms	21	Module 5 : Memory Organization	15
I. Binary Arithmetic.		I. Introduction and characteristics of memory	
II. Booths Multiplication Algorithm, Restoring and Non-restoring Division Algorithm.		II. Cache Memory:	
III. IEEE-754 Floating point Representation		Module 6 : Principles of Advanced Processor and Buses	21
Module 3 : Processor Organization and Architecture	15	I. Flynn's Classification	
I. Adder Circuits, Multiplexers & Demultiplexers		II. Multicore Architecture	
II. Introduction to Flip Flop		III. Introduction to buses	
III. Register Organization			

TERMWORK



MODULE 1 : COMPUTER FUNDAMENTALS

I. NUMBER SYSTEM & CODES

II. LOGIC GATES

III. FUNCTIONAL BLOCK DIAGRAM OF COMPUTER SYSTEM

IV. VON NEUMANN MODEL

OUTLINE FOR TODAY'S SESSION

- What is Signal
- What is Digital Signal
- How to represent a number
- Introduction to Number system
- Number System Conversion
- Example Solving
- Introduction to scientific calculator (use of different number system)
- Introduction to codes

WHAT IS SIGNAL?

- A signal is a variation in a physical parameter,
 - Examples:
 - temperature variation is a signal,
 - speech as I speak now it's a signal,
 - video is a signal,
 - light intensity variation

WHAT I WANT TO DO WITH SIGNAL?

- Send it to end user
- Reproduce
- Store



PROCESS the Signal

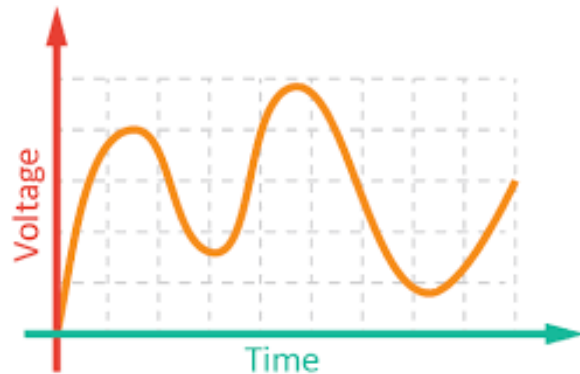
- Example, if you take a microphone the speech signal that you give into the microphone if necessary it needs to be amplified and then given out as a signal out of the speaker, the sound signal out of the speaker. So it is a typical signal processing scenario.

WHAT IS TRANSDUCER?

- A transducer is a sort of a device which converts non electrical quantity into an electrical quantity electrical signal known as the transducer.
- So the output of the transducers in electrical signal is where we define the signal as the variation of the parameter of interests the voltage or current with time

WHAT IS ELECTRICAL SIGNAL?

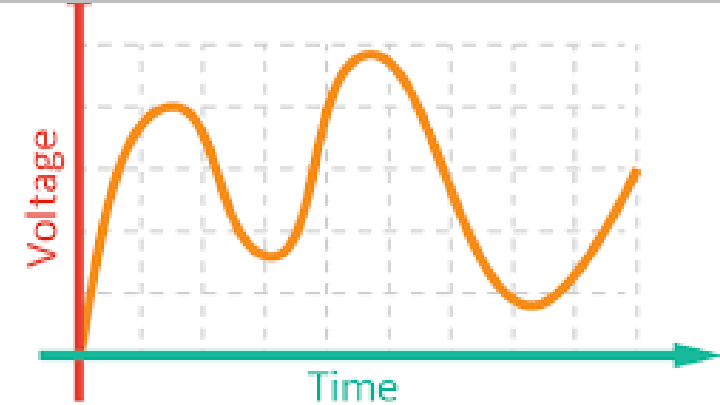
- Electrical signals that means variation of an electrical quantity a voltage or a current as a function of time. A signal is defined as a variation of electrical quantity usually a voltage or a current with time.



- A signal which does not change with time then it is not called a signal any more it is the DC value we say. (No need to Process)

WHAT IS ANALOG SIGNALS?

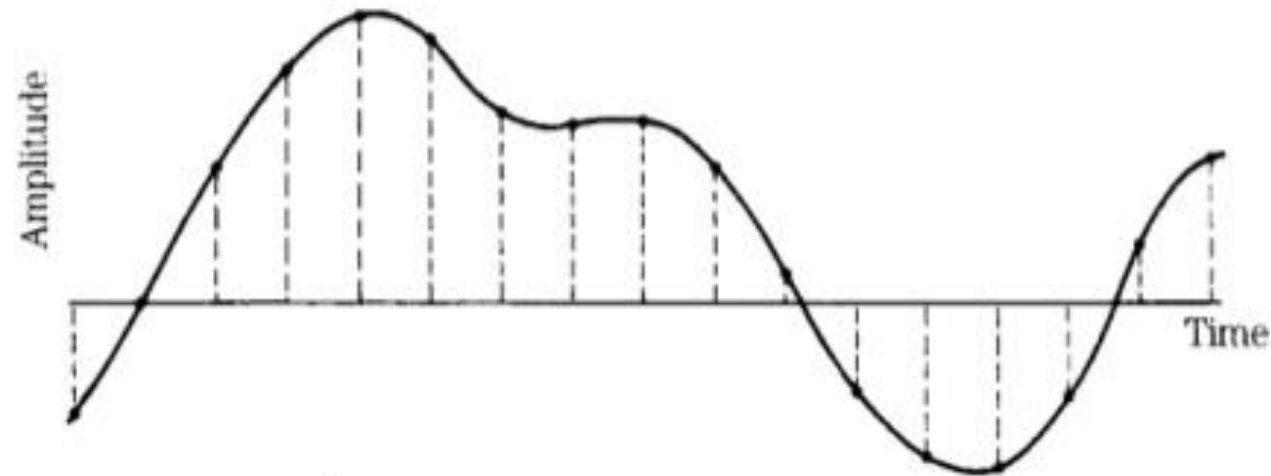
- Signal has always Limits
- Minimum is V_{MIN} (0)
- Maximum is V_{MAX}
- This variation of signal which can take any value between these two limits and such a signal is called analog signal.
- Analog signal or analog quantity can take any value at any instant of time within of course the limit defined within the range specified.



WHAT IS DISCRETE SIGNAL?

- Example
- I want to process the signal only at discrete instance of time.
- Suppose I want to monitor the temperature of a system every minute or every hour or every thirty minutes or(whatever you discretize the time) at which you look at the value of the signal
- The signal will vary continuously all the time and you are looking only at the discrete instance of time at a definite instance of time only
- An analog signal is a signal which takes any value between the two defined limits as a function of time. But even though the signal varies I am only interested in looking at specific intervals of time and such a signal is a subset of the analog signal that is called a discrete time signal

PICTORIAL VIEW (ANALOG TO DISCRETE)



A The input analog signal is sampled.



Suvarna Bhat

DIGITAL SIGNAL

FINALLY DIGITAL SIGNAL.....

- When I discretize the amplitude in addition to discretize the time I get what is known as digital signal.

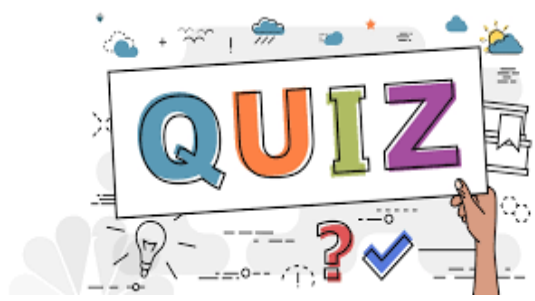
ANALOG VS DIGITAL

ANALOG SYTEM

- They process analog signal
- Data can't not be stored and do not have memory
- Less accurate
- Difficult to design
- Effect of noise is more

DIGITAL SYSTEM

- They process digital signal
- Data can be stored and memory is present
- Highly accurate
- Easy to design
- Effect of noise is less



1. Which option below lists the type of signal denoted by a sine

- a. Digital**
- b. Linear**
- c. Static**
- d. Analog**

2. Which option below lists the type of signal denoted by binary 1s and 0s?

- a. Digital**
- b. Linear**
- c. Static**
- d. Analog**