Program: B Sc

Course Code: BSCS2314

Course Name: Computer Graphics

Vision

To be known globally as a premier department of Computer Science and Engineering for value-based education, multidisciplinary research and innovation.

Mission

- ❑ **M1:** Developing a strong foundation in fundamentals of computing science with responsiveness towards emerging technologies.

- ❑ **M2:** Establishing state-of-the-art facilities and adopt education 4.0 practices to analyze, develop, test and deploy sustainable ethical IT solutions by involving multiple stakeholders.

- ❑ **M3:** Establishing Centers of Excellence for multidisciplinary collaborative research in association with industry and academia.

Course Outcomes (COs)

CO Number	Title
CO1	Describe the fundamental concepts of Computer Graphics. (K1)
CO2	To demonstrate with the relevant mathematics of computer graphics, ex. line, circle and ellipse drawing algorithms. (K3)
CO3	To understand the attributes of output primitives of Graphics. (K2).
CO4	Apply simple and composite transformation on graphic objects/elements in two dimensions. (K3).
CO5	Analyze two dimensions modeling and clipping techniques. (K4).
CO6	List out the various contemporary research areas and tool in graphics domain. (K2).

Course Prerequisites

- ❑ **Knowledge of Mathematics**
- ❑ **Fundamental knowledge of Computer**

Unit 1 - Overview of Graphics Systems

❑ **Video Display Devices**

❑ **Raster-Scan System**

❑ **Random-Scan Systems**

❑ **Graphics Monitors and Work Stations**

❑ **Input Devices: Hard Copy Devices, Graphics Software**

Video Display Devices

❑ A Video display device is an output device for presentation of information in visual way.

❑ When the input information is supplied as an electrical signal, the display is called an electronic display.

❑ Common applications for electronic visual displays are televisions or computer monitors.

❑ Different types of Video display devices are Cathode Ray Tube, Raster Scan displays, Random Scan displays, Color CRT-monitors, Direct View Storage Tube, Flat-Panel Displays, Light-emitting Diode(LED), Liquid-crystal Displays(LCDs)

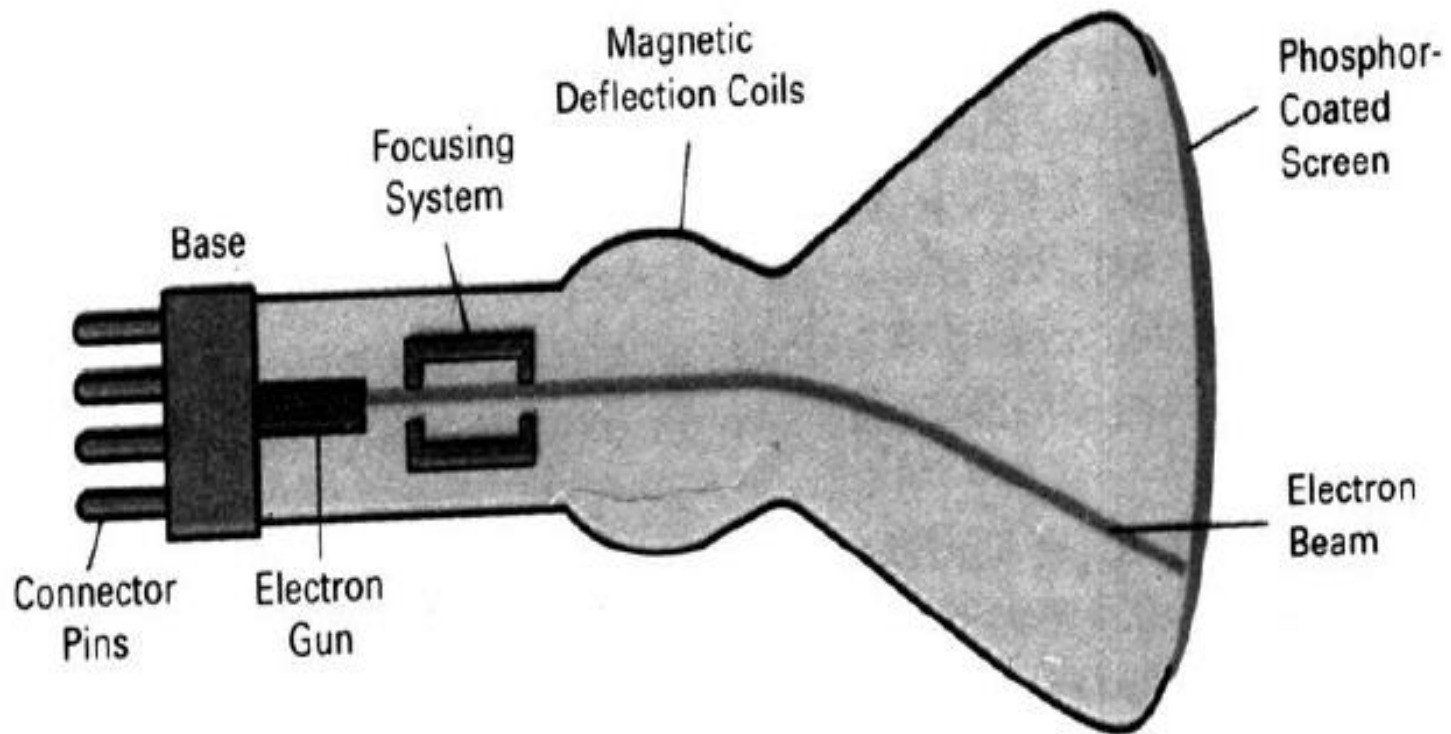# Video Display Devices
Cathode Ray Tube (CRT)

Figure 1: Cathode Ray Tube (CRT)

Video Display Devices
Cathode Ray Tube (CRT)

❑ Invented by Karl Ferdinand Braun(1897).

❑ Convert electrical signals to visual signals.

❑ Beam of electrons directed from cathode(-) to phosphor-coated (fluorescent) screen (anode(+)).

❑ Directed by magnetic focusing and deflection coils(anodes) in vacuum filled tube.

❑ Phosphor emits photon of light, when hit by an electron, of varied persistence (long 15-20 ms for texts/short <1 ms for animation)

❑ Phosphors are organic compounds characterized by their persistence and their color (blue, red, green).
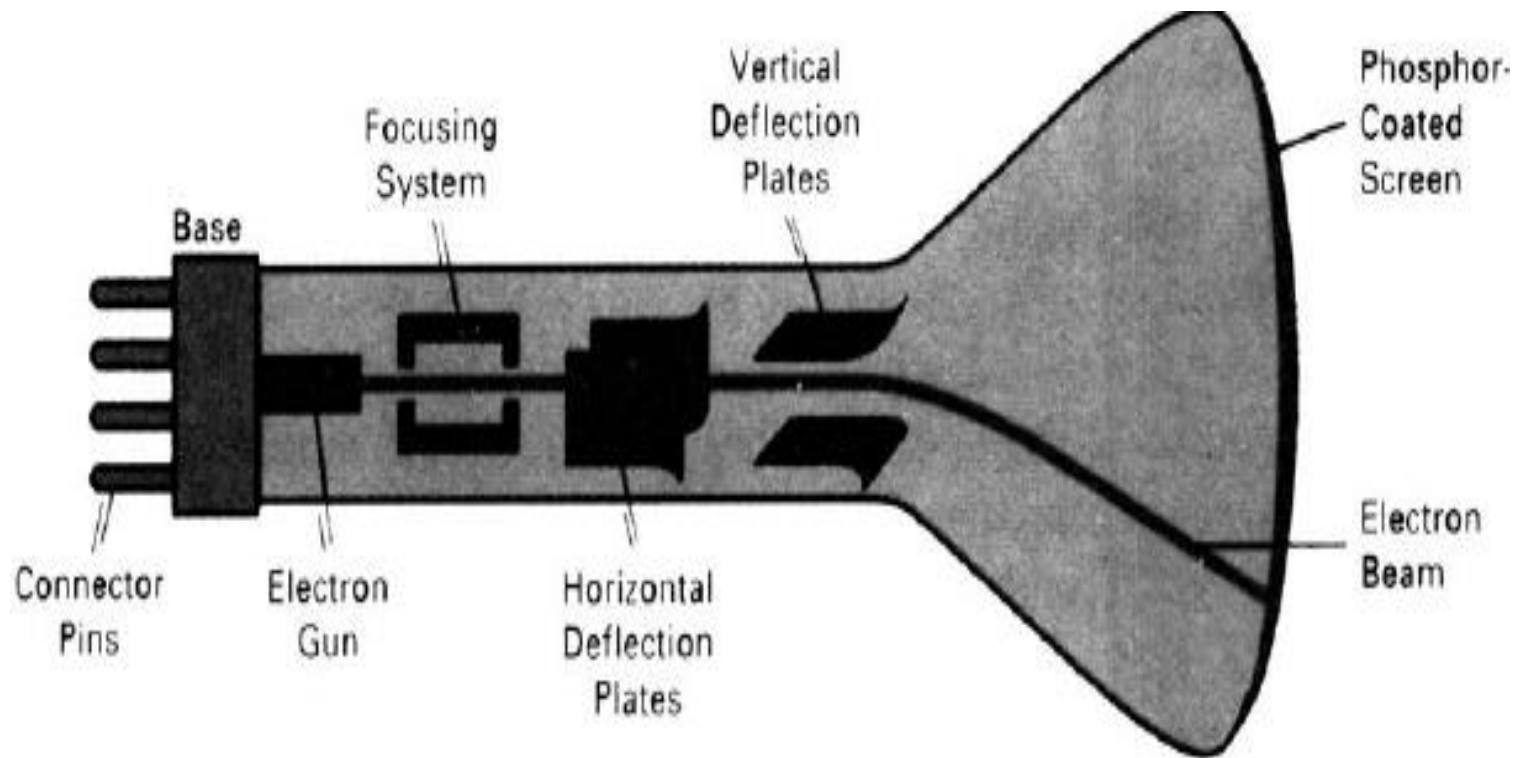
Video Display Devices
Cathode Ray Tube (CRT)

Figure 2: Cathode Ray Tube (CRT)

Video Display Devices
Characteristics of Cathode-Ray Tube (CRT)

❑ **Intensity:** It is proportional to the number of electrons repelled in beam per second (brightness).

❑ **Resolution:** It is the maximum number of points that can be displayed without overlap. It is expressed as number of horizontal points by number of vertical points. These points are called pixels (picture elements). Example: resolution 1024 x 768 pixels. Typical resolution is 1280 x 1024 pixels.

❑ High-definition systems means high resolution systems.

Video Display Devices

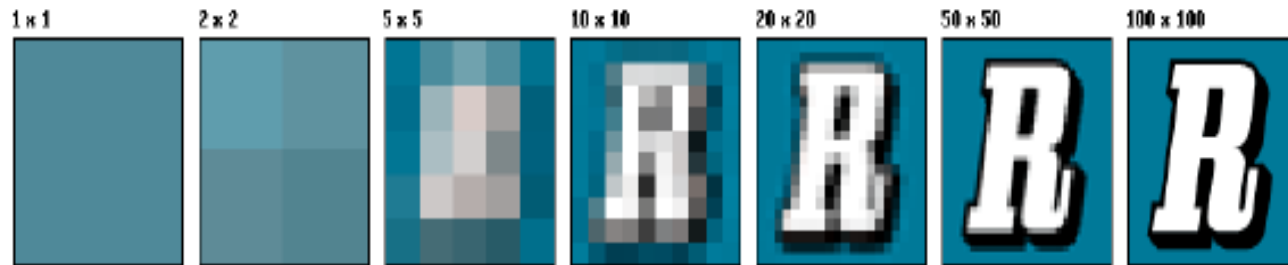## Characteristics of Cathode-Ray Tube (CRT)

Figure 3: Resolution

Video Display Devices
Related Terms

❑ **Fluorescence**: It is the light emitted as electrons lose their excess energy while the Phosphor is being struck by electrons.

❑ **Phosphorescence**: It is the light given off by the return of the relatively more stable excited electrons to their unexcited state, once the electron beam excitation is removed.

❑ **Persistence**: Time from the removal of the excitation to the moment when Phosphorescence has decayed to 10% of the Initial Light Output.

Video Display Devices
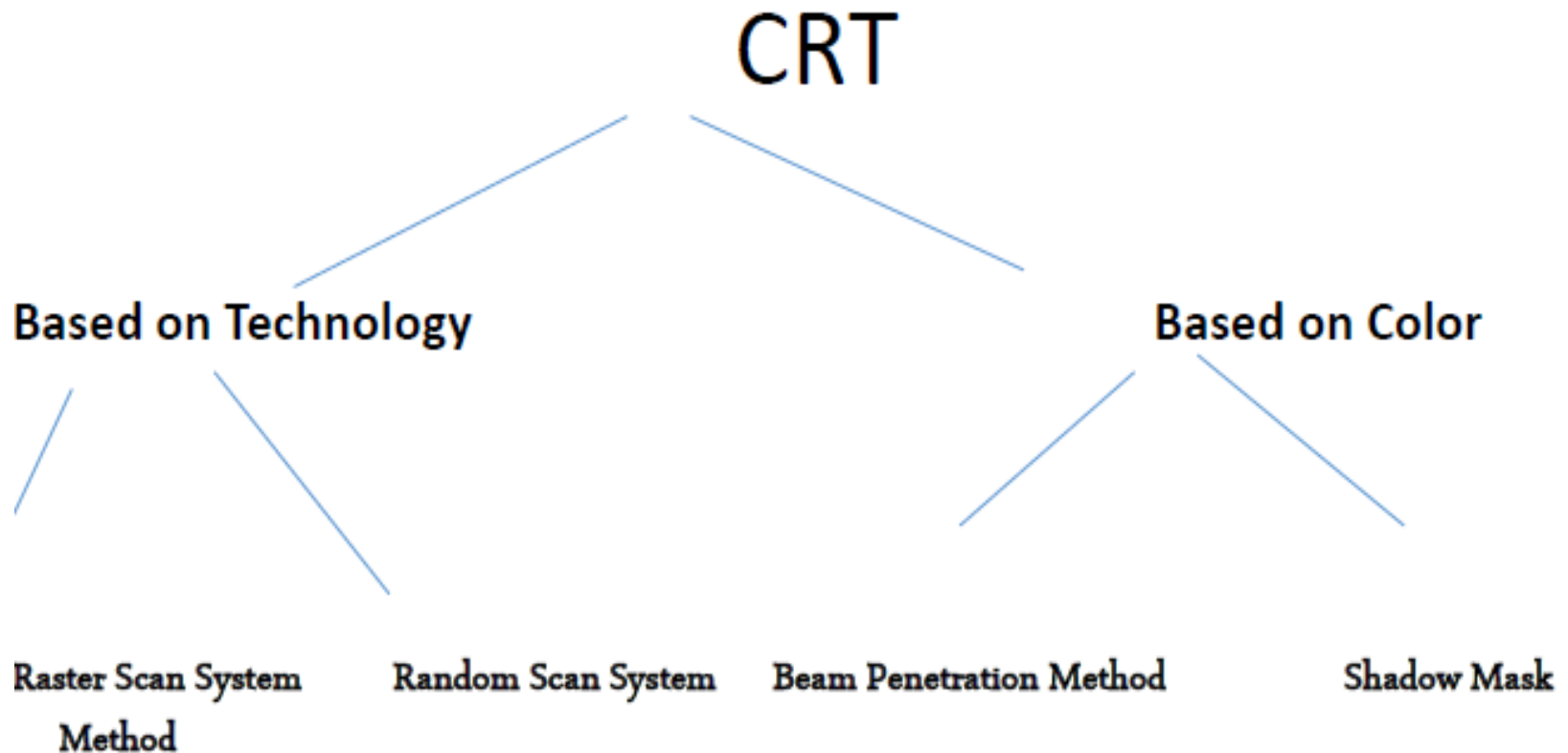## Categories Cathode-Ray Tube (CRT)

Figure 4: Types of CRT

Questions

❑ Define Raster scan displays?

❑ Write the properties of Video Display Devices?

❑ Explain CRT in detail.

❑ Illustrate the basic Refresh Operation of the Video Controller in Raster Scan display?

Recommended Books

Text books

❑ D. Hearn, P. Baker, "Computer Graphics - C Version", 2nd Edition, Pearson Education, 1997

Reference Book

❑ Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995.

❑ Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. Mc GrawHill.

❑ Shalini Govil-Pai, Principles of Computer Graphics, Springer, 2004

Additional online materials

❑ Coursera - https://www.coursera.org/learn/fundamentals-of-graphic-design

❑ https://www.youtube.com/watch?v=fwzYuhduME4&list=PLE4D97E3B8 DB8A590

❑ NPTEL - https://nptel.ac.in/courses/106/106/106106090/

❑ https://www.coursera.org/learn/research-methods

❑ https://www.coursera.org/browse/physical-science-and-engineering/research-methods

Thank You