🎨Computer Graphics Notes – AetherCode (Notion Template)

🏓Cover Page

Course Title: Computer Graphics – Visualize Your Imagination\ **Prepared By:** AetherCode Team\
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"Code. Notes. Clarity."

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Introduction

Computer Graphics involves creation, manipulation, and representation of visual images using computers. It bridges imagination and interaction.

🎯Applications of Computer Graphics

- Animation & Film
- Video Games
- CAD/CAM
- Simulation & Virtual Reality
- Scientific Visualization

✖️ Graphics System Components

- Input Devices: Keyboard, Mouse, Touch
- Output Devices: Monitors, Printers
- Graphics Pipeline
- Framebuffer

📺 Video Display Devices

- CRT (Cathode Ray Tube)
- LCD, LED, OLED
- Raster Scan vs Random Scan

🏑 Output Primitives

- Points
- Lines
- Polylines
- Curves
- Text
- Filled Regions

📷 Line Drawing Algorithms

- DDA (Digital Differential Analyzer)
- Bresenham's Line Algorithm

```
void lineBresenham(int x1, int y1, int x2, int y2);
```

🪃 Circle & Ellipse Drawing

- Midpoint Circle Algorithm
- Midpoint Ellipse Algorithm

🎙️ 2D Transformations

- Translation, Scaling, Rotation, Reflection, Shearing
- Matrix Representation

```
[ x' ]    [ T ] [ x ]
[ y' ] = [ T ] [ y ]
```

3D Transformations

• 3D Translation, Rotation (x, y, z axes), Scaling
• Homogeneous Coordinates

Clipping Algorithms

• Line Clipping: Cohen-Sutherland, Liang-Barsky
• Polygon Clipping: Sutherland-Hodgman

Viewing Pipeline

• Modeling → Transformation → Clipping → Projection → Rasterization

🎞️Color Models

• RGB, CMY, HSV
• Conversion between models

🎥3D Projection

• Parallel Projection
• Perspective Projection
• Projection Matrix

Hidden Surface Removal

• Z-buffer Algorithm
• Back-face Culling
• Painter's Algorithm

Summary

Computer Graphics enables real-time visuals, simulations, and artistic designs through mathematical and computational foundations.

Explore next: Summary PDFs and Exam Preparation Kits.