Syllabus

MCA-2104: COMPUTER GRAPHICS AND MULTIMEDIA
Max. Marks: 80
Times: 3 Hrs.
Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit.
Each question shall carry equal marks.

Learning Objectives:
1. Subject will help to understanding the core concepts of Computer Graphics. Student will be able to work on scan conversion, 2D, 3D – transformation and viewing and will be able to create interactive computer Graphics with understanding of shading.
2. This subject also helps to develop software in the Computer Graphics and Multimedia fields of increasing size and complexity across different
application areas.

Unit – I
An Introduction Graphics System: Computer Graphics and Its Types, Applications of computer graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Input Devices, Hard Copy Devices, Graphics Software.
Output Primitives and Attributes of Output Primitives: Output Primitives Points and Lines, Line Drawing Algorithms, Circle Generating Algorithms,
Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm, Cell Array, Character Generation, Anti-aliasing.

Unit – II
Two-dimensional Geometric Transformations: Basic Transformations, Matrix Representations and Homogeneous Coordinates,
Composite Transformations, Reflection and Shearing
Two-Dimension Viewing: The viewing Pipeline, Window to view port coordinates transformation, Point Clipping, Line Clipping,
Polygon Clipping, Text Clipping,
Three– Dimensional Concepts: Three Dimensional Display Methods,

3D Transformations, Parallel
Projection and Perspective Projection.

Unit – III
Curves and Surfaces: Bezier Curves, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic BSpline curves using uniform knot vectors, testing for first and second order continuities

Shading and Hidden Surface Removal: Shading, Illumination Model for diffused Reflection, Curved Surfaces, Gourard Shading, PhongModel,
Hidden Surface Removal, Back Face Detection, Depth Buffer (Z-Buffer, A-Buffer) Method, Scan Line Method, BSP-Tree Method.

Unit – IV
Multimedia: Introduction to Multimedia: Classification of Multimedia, Multimedia Software, MIDI, Components of Multimedia **–**
Audio: Analog to Digital conversion, Audio play backing and recording Video, Text: Hyper text, Hyper media and Hyper Graphics,
Graphics and Animation: Classification of Animation, process of animation, Authoring Process and Tools.

Course Outcomes:
CO1: Have a basic understanding of the core concepts of computer graphics.
CO2: Be capable of using OpenGL to create interactive computer graphics.
CO3: Understand a typical graphics pipeline.
CO4: Have made pictures with their computer.
CO5: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO6: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.

COMPUTER GRAPHICS   CSE-II / NET

BRIEF DISCUSSION

UNIT-1ST

BASIC CONCEPTS:-

WHAT IS CG?
APPLICATIONS
H/W & S/W

VIDEO DISPLAY ✓
DEVICES
· CRT   (10-20)
· RANDOM / RASTER   MAKE
  SYSTEMS
· I/P DEVICES.

→ 2D GRAPHICS PRIMITIVES
· POINT, LINES ✓
· LINE DRAWING ALGO
· CIRCLE DRAWING ALGO
· ELLIPSE DRAWING ALGO
  FILLING ALGO:-
  · SCAN LINE POLYGON
  · FLOOD LINE CUR

· BOUNDARY FILLING.
· FLOOD FILLING.

UNIT - 2ND

2-D-GEO. TRANSFORM
& VIEWING:-

→ TRANSLATION, SCALING,
  ROTATION, REFLECTION &
  SHEAR TRANSFORMATION.
→ HOMOGENEOUS
  COORDINATE.

VIEWING PIPELINE

→ WINDOW TO VIEW-
  -PORT TRANS.
→ MAPPING.

CLIPPING ALGO ++
→ POINT & LINE ALGO
→ 4 BIT CODE ALGO
→ COHEN SUTHER
→ LIANG LINE CLIP.

*
→ LIANG BARSKY LINE
  CLIPPING ALGO
→ POLYGON CLIPPING-
  SUTHERLAND-HODGEMAN
→ CURVE & TEXT CLIP.

UNIT - 3RD

3-D-GEO TRAN & VIEWING
→ PROJECTION - PARALLEL &
  PERSPECTIVE   **.

→ IN 3RD UNIT
  UNIV-EXAM

3D-VIEWING **

UNIT 4th

REPRESENTATION OF
3D-CURVES & SURFACES
→ CURVED LINES &
  SURFACES

$(65 - 80\%)$

→ SPLINE REPRESNT - B-Spline
→ INTERPOLATION   (10-20)
→ PARAMATERIC CONDITIONS
→ GEOM. CONT. CONDITION

→ BEIZER CURVE & PROPERTIES (10-20)

HIDDEN SURFACES / REMOVAL ALGO
→ DEPTH BUFFER —
→ SCAN LINE & COHERENCE & AREA COH.   (10-20)
→ PRIORITY ALGO. =

UNIT 5th / 6th

ILLUMINATION MODEL

COLOUR L IMAGE RELATED CONCEPT.