THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

**UNIVERSITY EXAMINATION FOR DEGREE IN
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSc. I.T. 9S)
(YR III, SEM II)**

ICS 2311: COMPUTER GRAPHICS

END OF SEMESTER II EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

SECTION A (*Compulsory*)

QUESTION 1 (30 marks)

a) Define the term "computer graphics"   [2 marks]

b) Outline the role played by openGL in computer graphics   [3 marks]

c) Explain the following open GL terms   [3 marks]

      i.   FLTK
    ii.   GLUT
   iii.   BOOST

d) Describe using a diagram the construction and operation of a colored CRT monitor   [5 marks]

e) (i) Define the term polygon clipping   [2 marks]

    (ii) Write a Cohen–Sutherland clipping algorithm a line within a viewport   [5 marks]

f) Give **TWO** characteristics of each of the following display devices
      i.   Plasma
    ii.   LCDs
   iii.   LEDs   [6 marks]

g) Define the following terms
    i.   Color model
    ii.   Pixel
    iii.   Vector graphic
    iv.   Raster image
    v.   Virtual reality environment   [5 marks]

h) List **FOUR** applications of computer graphics in industry   [4 marks]

SECTION B (*Attempt any TWO questions*)

QUESTION 2(20 marks)

a) Explain the openGL rendering pipeline using a diagram   [4 marks]

b) Sketch **FOUR** types of openGL 3D primitives   [2 marks]

c) Illustrate the following computer graphics objects

    i.   Bezier
    ii.   Bezieregon
    iii.   Polygon
    iv.   Wireframe   [8 marks]

d) Write the Brenshem line drawing algorithm   [6 marks]

QUESTION 3(20 marks)

a) Identify three standard computer graphics formats that are synonymous with the World Wide Web
    [3 marks]
b) Distinguish between the RGB color model and the CMYK model clearly stating where each may be used   [5 marks]
c) Differentiate with diagrams the following types of camera views   [6 marks]

    i.   One point perspective
    ii.   Two point perspective
    iii.   Isometric view   [6 marks]

QUESTION 4 (20 marks)

a) Define the following terms
    i.   Euclidean space
    ii.   Parametric surface
    iii.   computer aided design   [6 marks]

b) Outline **FOUR** advantages of using a CAD program over manual drawing   [4 marks]

c) Describe the following computer graphics transformation techniques
    i.   translation
    ii.   rotation
    iii.   scaling
    iv.   reflection
    v.   shear   [5 marks]
d) Describe with a diagram the construction and operation of a cathode ray tube   [5 marks]

QUESTION 5 (20 marks) CASE

Rendering is the process of generating an image from a model (or models in what collectively could be called a *scene* file), by means of computer programs. A scene file contains objects in a strictly defined language or data structure; it would contain geometry, viewpoint, texture, lighting, and shading information as a description of the virtual scene.

The data contained in the scene file is then passed to a rendering program to be processed and output to a digital image or raster graphics image file. The term "rendering" may be by analogy with an "artist's rendering" of a scene. Though the technical details of rendering methods vary, the general challenges to overcome in producing a 2D image from a 3D representation stored in a scene file are outlined as the graphics pipeline along a rendering device, such as a GPU

Many rendering algorithms have been researched, and software used for rendering may employ a number of different techniques to obtain a final image. The main ones include **rasterization, scanline rendering**, **ray tracing** and **radiosity**

a) Explain the following rendering terms

     i.   texture-mapping

    ii.   bump-mapping

   iii.   refraction

   iv.   diffraction

    v.   motion blur

   vi.   photorealistic   [12 marks]

b) Outline the following rendering techniques

     i.   rasterization
    ii.   scanline rendering
   iii.   ray tracing
   iv.   radiosity   [8 marks]