**BENEDICT MUFARO PABAZHIRA**

**C108800P**

**COMPUTER GRAPHICS ASSIGNMENT 1.**

**QUESTION 1**

**1.(a)** Computer Graphics is everything on computers that is not text or sound. Computer graphics is drawing pictures on computers. Nuclear Medicine uses computer graphics to display images.

**(b)** OpenGL is a low level API which provides basic geometric primitives which are lines points and triangles. It is also a software interface to graphics hardware.

For points

glBegin(GL\_POINTS);

glVertex(0.0 , 0.0);

glVertex(1.3 , 4.5);

glEnd();

For Lines

glBegin(GL\_LINES);

glVertex(1.7 , 2.0);

glVertex(7.3 , 9.5);

glEnd();

For Polygon

glBegin(GL\_POLYGON);

glVertex(0.0 , 0.0);

glVertex(1.3 , 4.5);

glVertex(1.5, 3.7);

glVertex(1.7 , 2.0);

glVertex(7.3 , 9.5);

glEnd();

**(c) (i)** Patten Recognition is the process done by the computer in computer graphics of analysing data received from external devices such as digital cameras. This will deduce the arrangements and series of images.

**(ii)** Computer Vision is a field that includes methods for acquiring, processing, analysing, and understanding images and, in general, high-dimensional data from the real world in order to produce numerical or symbolic information.

**(iii)** Image Processing is the process of transforming one image to another, *e.g.*, by pixel-wise operations such as contrast enhancement, local operations such as edge extraction or noise removal, or geometrical transformations such as rotating the image.

**(iv).** Information Visualisation is the study of (interactive) visual representations of abstract data to reinforce human cognition. The abstract data include both numerical and non-numerical data, such as text and geographic information.

**(d) (i)** Computer graphics are vastly used in Engineering. The Engineering Design Integration System is an example of how computer graphics can be implemented in Engineering. The system is used for evaluation of aerospace vehicles preliminary designs, using photographic processes.

**(ii)** Computers Graphics have become an indispensable tool in Archaeology. They have been used for a long time in archaeology to record the excavations plans, to illustrate the artefacts found and to present the results of the analyses.

**(iii)** In Life Sciences computer graphics has been implemented through the use of microscopic Imaging and x-rays in biology and medical sciences. This helps for a deeper understanding and a better visualisation of the existing scenarios.

**(iv)** Computer graphics has been used in Business Computing a lot. They can be implemented through the use of power points in presentations. Images, charts and graphs provide a visual presentation of financial information in presentations.

**QUESTION 2**

1. **(i)** Emissive display flat panel are devices that convert electrical energy into light. Plasma panels are an example of emissive display flat panel. On the other hand non-emissive display flat panel use optical effects to convert sunlight or light from some other source into graphics pattern. An example of a non-emissive display flat panel is a liquid crystal device.

**(ii)** Storage needed for the Frame Buffer is.

(8 inch\* 100 pixels/inch)\*(10 inch\* 100 pixels/inch)\*6 bits÷ 8 bits per byte ≈ 0.57MB

1. Additive colour models use light to display colour while subtractive models use printing inks. Colours perceived in additive models are the result of transmitted light. Colours perceived in subtractive models are the result of reflected light. Since additive colour models display colour as a result of light being transmitted (added) the total absence of light would be perceived as black. Subtractive colour models display colour as a result of light being absorbed (subtracted) by the printing inks. As more ink is added, less and less light is reflected. Where there is a total absence of ink the resulting light being reflected (from a white surface) would be perceived as white.
2. **(i)** A very crude explanation of Aliasing would be that Aliasing is the direct effect of using squares (pixels) to display an image. It appears on an object’s edge as a “rough margin”. The two major types of aliasing are temporal aliasing this is where there is a defined period of time of distortion of information and spatial aliasing is where the distortion of information is sparse partially.

**QUESTION 3**

**3 (a)** Computer animation is a process of generating successive drawings or images using computers giving an illusion of movement. Computer animation only refers to moving images.

A key frame in animation and filmmaking is a drawing that defines the starting and ending points of any smooth transition.

In-between frame is the intermediate frame between two images to give the appearance that the first image evolves smoothly into the second image. In-betweens are the drawings between the key frames which help to create the illusion of motion.

**(b).** There are a few different ways that animation in computer graphics can be developed to make computer animations. One is 3D animation. One way to create computer animations is to create objects and then render them. This method produces perfect and three dimensional looking animations.

Another way to create computer animation is to use standard computer painting tools and to paint single frames and composite them. These can later be either saved as a movie file or output to video.

One last method of making computer animations is to use transitions and other special effects like morphing to modify existing images and video.

**(c)** In my commercial which includes a human running I would use Motion Capture. It relies on small sensors that are placed on the human at various points around his body. The human runs and his motions are captured by a camera that can locate the sensors and trace his movement. This motion can then be transferred to a computer-designed figure that will move in precisely the same way as the human did.