FACULTY OF ENGINEERING & TECHNOLOGY
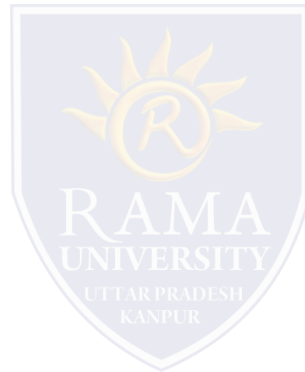
BCS -504 Computer Graphics & Multimedia

Lecture-23

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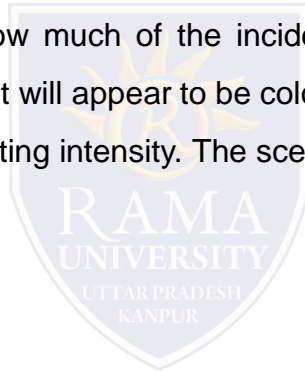➢ **Introduction of Shading**

➢ **Constant Intensity Shading**

Introduction of Shading

Shading is referred to as the implementation of the illumination model at the pixel points or polygon surfaces of the graphics objects.

Shading model is used to compute the intensities and colors to display the surface. The shading model has two primary ingredients: properties of the surface and properties of the illumination falling on it. The principal surface property is its reflectance, which determines how much of the incident light is reflected. If a surface has different reflectance for the light of different wavelengths, it will appear to be colored.

An object illumination is also significant in computing intensity. The scene may have to save illumination that is uniform from all direction, called diffuse illumination.

Shading models determine the shade of a point on the surface of an object in terms of a number of attributes. The shading Mode can be decomposed into three parts, a contribution from diffuse illumination, the contribution for one or more specific light sources and a transparency effect. Each of these effects contributes to shading term E which is summed to find the total energy coming from a point on an object. This is the energy a display should generate to present a realistic image of the object. The energy comes not from a point on the surface but a small area around the point.
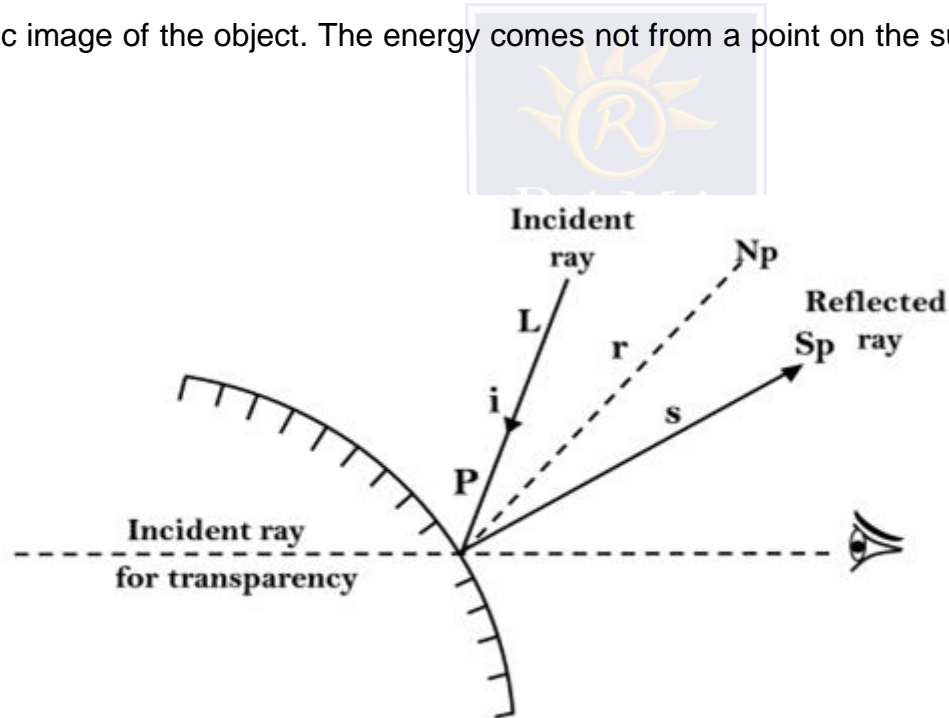
The simplest form of shading considers only diffuse illumination:

$$E_{pd}=R_p\ I_d$$

where E_{pd} is the energy coming from point P due to diffuse illumination. I_d is the diffuse illumination falling on the entire scene, and R_p is the reflectance coefficient at P which ranges from shading contribution from specific light sources will cause the shade of a surface to vary as to its orientation concerning the light sources changes and will also include specular reflection effects. In the above figure, a point P on a surface, with light arriving at an angle of incidence i, the angle between the surface normal N_p and a ray to the light source. If the energy I_{ps} arriving from the light source is reflected uniformly in all directions, called diffuse reflection, we have

$$E_{ps}=(R_p\ \cos\ i)I_{ps}$$

This equation shows the reduction in the intensity of a surface as it's tipped obliquely to the light source. If the angle of incidence i exceeds90°, the surface is hidden from the light source and we must set $E_{ps}$to zero.

Constant Intensity Shading

A fast and straightforward method for rendering an object with polygon surfaces is constant intensity shading, also called Flat Shading. In this method, a single intensity is calculated for each polygon. All points over the surface of the polygon are then displayed with the same intensity value. Constant Shading can be useful for quickly displaying the general appearances of the curved surface as shown in fig:

(a) (b) (c)

Fig: A Polygon mesh approximation of an object
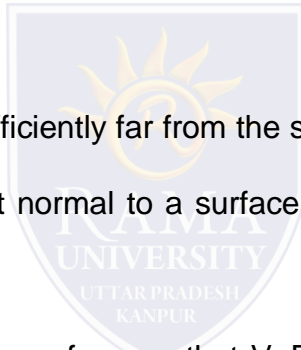(a) is rendered with flat shading (b) and With Gouraud shading (c)

n general, flat shading of polygon facets provides an accurate rendering for an object if all of the following assumptions are valid:-

The object is a polyhedron and is not an approximation of an object with a curved surface.

All light sources illuminating the objects are sufficiently far from the surface so that N. L and the attenuation function are constant over the surface (where N is the unit normal to a surface and L is the unit direction vector to the point light source from a position on the surface).

The viewing position is sufficiently far from the surface so that V. R is constant over the surface (where V is the unit vector pointer to the viewer from the surface position and R represent a unit vector in the direction of ideal specular reflection).

MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	Reduce memory requirements in raster scan system methods have been devised for organizing the ……..	buffer BLOCK	frame buffer	framing	All of these
2	Each scan line as a set of integer pair one number indicate number of adjacent pixels on the scan line that are having same intensity and second stores intensity value this technique is called …... encoding.	run-length	run	length	none of these
3	Keyboards are used as entering text strings. It is efficient devices for…...such a non-graphics data as picture label.	OUPUT	inputting	outcome of a real-world	result
4	Cursor control key's & function keys are common features on ……………. keyboards	general purpose	specific purpose	no purpose	none of these
5	Mouse is small size hand-held box used to position ………….	movement	Rotation	screen cursor	none of these

- http://www.engppt.com/search/label/Computer%20Graphics