

ENSC / PES 1600 Fall 2010
Review Test 3

Reflectance Factor:

Transmittance Factor:

Lumens (*lm*)

Candlepower (*cd*):

Illuminance (*fc*), (*lx*):

Luminous Intensity (*candlepower*) (*cd*):

Luminance (*cd/ft²*), (*cd/m²*):

Brightness:

Incandescent light bulb	100 W = 1,740 <i>lm</i>
20° spot light	100 W = 2,000 <i>lm</i> or 7,400 <i>cd</i>
110° flood light	100 W = 2,000 <i>lm</i> or 1,100 <i>cd</i>

Fluorescent light 100 W = 7,800 *lm*

High pressure Na Vapour lamp 100 W = 9,500 *lm*

Radiometry:

Radiant Energy (J) = (W * s):

Radiant Energy Density (J/m³):

Radiant Flux or Radiant Power (W) = (J/s):

Radiant Flux Density at a surface (W/m²) may be:
emitted (*scattered, reflected*) from a surface, in which case it is called: **Radiant Exitance** (W/m²), or:
incident onto a surface, in which case it is called: **Irradiance** (W/m²).

Radiant Flux emitted per unit of solid angle (ω) by a point source in a given direction is called the:
Radiant Intensity (*often confused with irradiance*).

Inverse-square law *flux diagram*

Osmium filaments

Tungsten Filaments

Argon as inert gas

Qualities of Quartz as glass on lamps

Carbon-arc street lamps

Henri Becquerel... with reference to low pressure Hg vapour

High Intensity Discharge (HID) Lamps

Colour of Neon Gas

Coating of Fluorescent tubular lamps are coated with:

Hg lamps emit a Cool (blue, & green) light.

Vapourization of liquid mercury

Phosphorescence:

Bio-Luminescence:

An atom in an excited state usually decays (*de-excites*) rapidly to a lower state by the emission of a photon.

Winter month's natural daylight

Summer month's natural daylight.

Addition of various wavelengths of visible light

Cones & Rod cells in the human eye

Allowed lighting power for a building in which the entire building's lighting system is designed and permitted at one time is called: "complete building method"

Phosphors are excited by the absorption of UV photons & therefore fluoresce. Such process is called secondary process.

LASER

Incoherent Light:

Coherent Light:

The first LASER was produced using a ruby crystal.

Air Mass:

Beam radiation:

Diffuse radiation:

Total solar radiation:

INSOLATION:

$360^\circ = 24 \text{ hours}$

$15^\circ = 1 \text{ hour}$

Ephemeris Time

Sidereal Time:

Sidereal Day:

Local Sidereal Time is defined as the angle of the vernal equinox

Tropical Year:

Anomalistic Year:

Gregorian Calendar:

International Atomic Time (TAI):

Average Day:

Mean Solar Day:

Celestial Meridian:

Vernal Equinox:

Hour Angle (H):

Solar Altitude Angle:

Solar Zenith Angle:

Solar Constant (S) top of Earth's atmosphere: $\sim 1,366 \text{ W/m}^2$

Solar Constant (S) due to the Scattering & Reflection of solar rays: $\sim 1000 \text{ W/m}^2$

Scattering of radiation as it passes through the atmosphere caused by interaction of the radiation with air molecules.

Absorption of radiation in the atmosphere in the solar energy spectrum

Pyrheliometer:

Pyranometer:

Solar Tracking Systems:

Active *(single and dual axis)*

Passive *(single and dual axis)*

Single Axis *(tilt movement)* solar capture power: $\sim 20 - 25\%$

Dual Axis *(interval movement adjusting for angle position)* solar capture power: $\sim 30 - 40\%$

Fixed Axis *(limited in movement & tilt position)*

Types of Solar Trackers:

- a. Polar Trackers
- b. Horizontal Axle Trackers
- c. Passive Trackers
- d. Active Trackers
- e. Vertical Axle Trackers

Types of Lighting Fixtures (*Luminaries*):

- Direct
- Semi-direct
- General diffuse
- Direct-Indirect
- Semi-Direct
- Indirect *(recessed ceiling light)*

Equations:

Illumination under a streetlight in foot candles: $fc = cd / d^2$

Illuminance equation: $fc = lm / \text{area}$

“ δ ” Solar Declination equation:

“ β ” equation:

Extra-Terrestrial Radiation incident on the plane normal to the radiation on the n^{th} day of the year:

$$[1 + 0.033 (\cos (360(n) / 365))]$$

<i>Month</i>	<i>n</i>
<i>January</i>	<i>i</i>
<i>February</i>	31 + <i>i</i>
<i>March</i>	59 + <i>i</i>
<i>April</i>	90 + <i>i</i>
<i>May</i>	120 + <i>i</i>
<i>June</i>	151 + <i>i</i>
<i>July</i>	181 + <i>i</i>
<i>August</i>	212 + <i>i</i>
<i>September</i>	243 + <i>i</i>
<i>October</i>	273 + <i>i</i>
<i>November</i>	304 + <i>i</i>
<i>December</i>	334 + <i>i</i>