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## 6.163 Strobe Project Laboratory

### Sample quiz

1

Your camera is loaded with ASA 400 film. You need to take a flash-only photograph in a laboratory in which you cannot turn off the lights. Using a light meter you determine that the ambient light would produce a properly exposed photograph at  $f/5.6$  and a shutter speed of  $1/125$  second. However, your camera cannot flash sync at shutter speeds shorter than  $1/60$  second. The camera-to-subject distance is 6 feet, and magnification can be neglected. What BCPS flash is required?

2

The CCD imaging chip in the Kodak Ektapro High Speed Video System is a 2-dimensional array of sensing elements (pixels). The size of an individual pixel defines the highest resolution the system can achieve. The sharpest images are obtained when the blur is restricted to a single pixel.

2-A Assume that you will be collecting images using a steady light source. In this situation the exposure time is the reciprocal of the frame rate (number of images per second). Devise a general equation for the maximum permissible subject velocity as a function of frame rate, image magnification, and pixel width, allowing no more than one pixel's width of movement during the exposure.

2-B Now assume that you have a choice of flash sources that can be synchronized to the video system. In this situation it is the flash duration and not the frame rate that determines exposure. Devise a general equation for the maximum permissible subject velocity as a function of flash duration, image magnification, and pixel width, allowing no more than one pixel's width of movement during the exposure.

3

You have been hired to take photographs of an atomic bomb blast. Clearly, your equipment cannot be too close to the subject -- in fact, it has to be 7 miles away. You will be using 4x5 film (4 in. x 5 in. format). Your image must cover an area that is 700 feet wide (with the 5" film dimension). What focal length optical system do you need? Express the answer in metric units.

4

A typical small point-and-shoot camera has a fixed-focus 35mm f3.5 lens. The small flash unit that comes with it has a flash energy of approximately 8 joules. What is the maximum distance at which you could use this camera to take a flash-only picture with 400 ASA film? Assume a photometric efficiency of 3 and a reflector factor of 6.