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UNIVERSITY OF ZAMBIA

MID–SECOND SEMESTER TEST
MARCH 2012
GE 332
Photogrammetry I

Instructions:
Time: THREE (2) hours
Answer **ALL** questions from section A and **ONE** from section B

SECTION A

Question ONE(1)

a) Define briefly, the following photographic terms:
- Aperture - lens opening
- F-number - the ratio of the focal length to the diameter of the lens opening
- Illuminance - the amount of light received per unit area on the image plane during exposure
- Nadir point -
- Principle distance -
- Flying height - altitude of the camera
- side lap - adjacent flight strips overlap

b) An aerial camera makes an exposure at a shutter speed of 1/1,000 sec. If the aircraft speed is 500 miles per hour, how far will the aircraft travel during the exposure?

c) What are the causes of radial lens distortion? List two of its characteristics. Use sketches to illustrate your answer
Radial lens distortion is caused from faulty grinding of the lens.

d) What are the relationships between?
- F-number and shutter speed
- Film speed and emulsion grain size
- Resolution and emulsion grain size

(6+7+6+6) marks

Question TWO (2)

a) What is meant by a vertical photograph? What is meant by a nearly vertical photography?

b) A vertical photograph captured at a flight height of 2000′ above sea level shows a radio tower with a base elevation 540′ above the same datum. The image of the tower has a relief displacement of 1.33". The distance from the photograph's principal point to the top of the tower is 5.97". What is the height of the tower?

c) Mention and explain one of the methods of camera calibration.

d) The line lies on fairly level terrain. Find the approximate flying height above terrain if the camera focal length = 90mm and the section line ab = 100mm (on photo) and on terrain AB = 1000m.

(7+5+8+5) marks

Question THREE (3)

(a) Discuss the darkroom procedure for black and white emulsion. Explain when and why a 'safe' light can be used in a darkroom

(b) Discuss the characteristic curve H and D, or D-log- E curve.

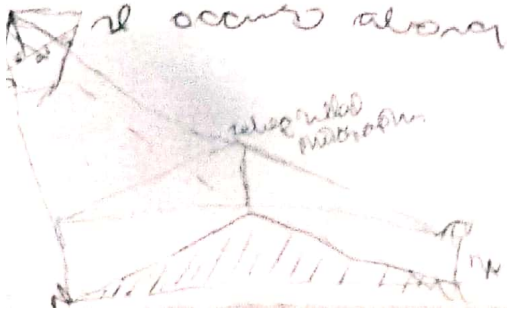
(c) Define the following terms:

- Filter
- Density
- Contrast
- Resolution

(d) Explain briefly,

- 'Depth of field'
- What are the effects of tilt and relief displacement on a photo?

(7+5+8+5) marks



SECTION B

Question FOUR (4)

a) Discuss briefly,

i. The principle difference between a 'map' and a 'photo'

ii. Virtual and Real Image formation

b) What is meant by exterior orientation? What parameters are involved?

c) An aerial camera with IMC (Image Motion Compensation) is used to acquire photography at a flying height of 5200 m above ground. The focal length is 153.15 mm. The aircraft is flying at 325 km/hr and an exposure time of 1/250 second is used. How far across the focal plane must film travel during the exposure in order to obtain an image with no image motion blurring? (10+8+7) marks

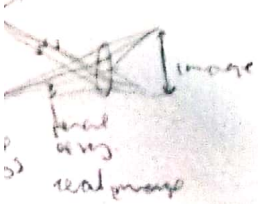
Question FIVE (5)

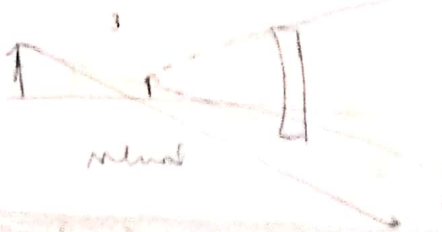
a) Describe the meaning of photosensitivity and spectral sensitivity of photographic material.

b) What is a diapositive and give one example?

c) Define the following photographic terms:

- Nodal points
- focal points
- focal length **Focal length is defined as the distance from the focal plane to the center of the lens when focused at infinity (figure 6.4).**





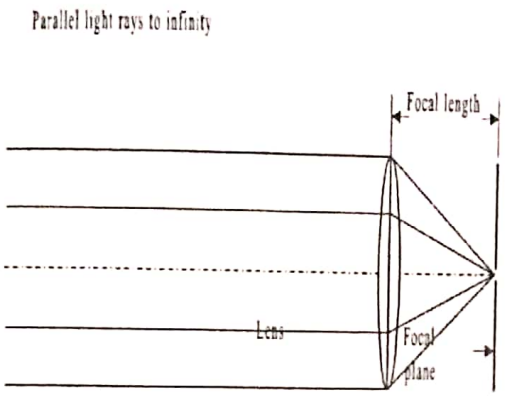


Figure 6.4. Focal length of a simple lens. (From Paine, 1981)

d) The image distance for a photograph of an object, which is located 4.5 meters from the camera, is 76.5mm. What image distance is required for perfect focus if the object is in infinity?

(10+3+6+6) marks