The University of Zambia

School of Engineering

Department of Geomatic Engineering

2014/2015 Academic Year Term 3 TEST

GEE 3622:   Principles of Data Acquisition and Processing
FRIDAY 22nd MAY 2015
Time: Two (2) Hours

Instructions

1.   This TEST is Closed Book
2.   Calculators are permitted
3.   Time allowed is Two (2) Hours
4.   Answer: ALL QUESTIONS FROM SECTION (A) AND ONE FROM SECTION (B)
5.   Show all the work leading to the solution
6.   Total marks for this TEST paper is 100

SECTION A

Question 1 [10+5+10 marks]

a) Define the following photogrammetric terms:

- Exposure Station

- Interior orientation parameters

- Exterior orientation parameters

- Focal Plane

- Fiducial Marks

b) The figure below shows the field of view of a a typical single lens camera.

Given that f=150 mm and d= 23cm, compute the angular field of view α.

Focal Plane

α = Angular field of view
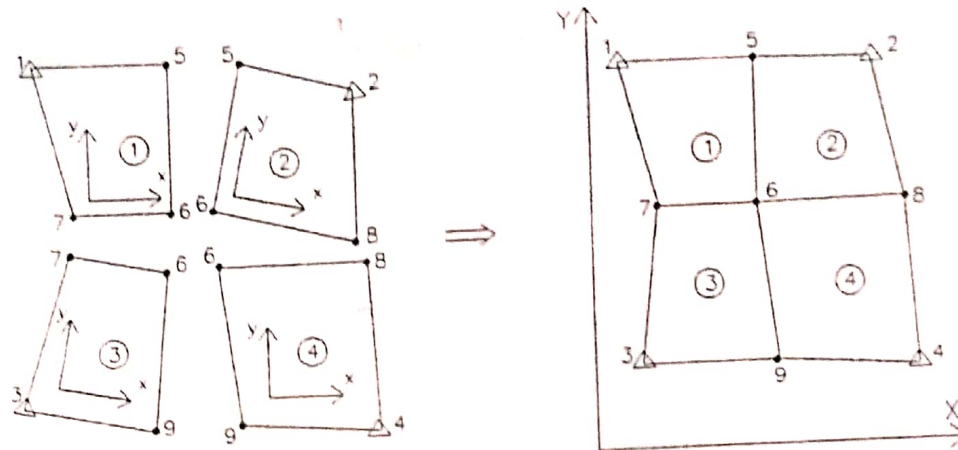
Rear Nodal Point of Lens
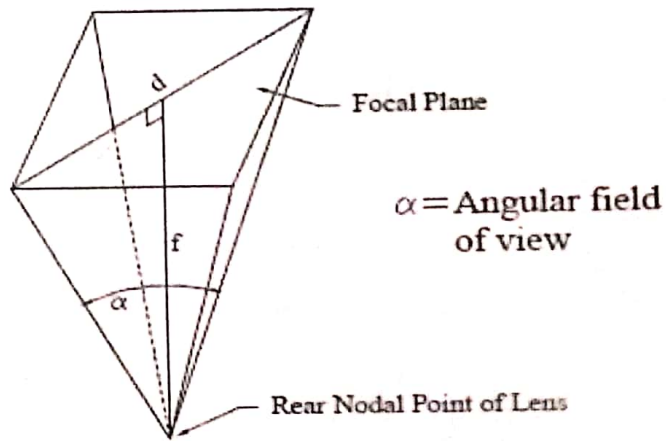
c) With the help of sketches, briefly, explain the following terms:

- Principle Point

- Conjugate Principle Point

- Ground Nadir Point

- Object Space

- Image Space

Question 2 [5+10+5+5 marks]

a) Explain the main purpose of aerial triangulation.

b) The figure below shows the planimetric block adjustment by independent models.

i. Briefly, state the planimetric adjustment involved.

ii. Which points refer to the 'control' points?

iii. Which points refer to the 'Tie' points

Question 3 [5+5+5+5+5 marks]

A project area is 16 km wide in the east-west direction and 10.4 km long in the north-south direction. A camera having a 152.4-mm-focal-length lens and a 230-mm format is to be used. The desired photo scale is 1:12, 500 and the nominal end lap and side lap are to be 60 and 30 percent, respectively. Beginning and ending flight lines are to be positioned along the boundaries of the study area. The only map available for the area is at a scale of 1: 50,000. This map indicates that the average terrain elevation is 300 m above datum. Compute the following data for the flight crew:

i. Flying height above mean sea level

ii. Ground coverage

iii. Distance between two successive axes of the strips.

iv. Number of flight lines

v. Total number of photos

SECTION B

Question 4 [10+5+10 marks]

a. Explain the difference between a vertical photograph and a tilted photo.

b. What is relief displacement?

c. A vertical photo is taken from a height of 535 m above the datum. The elevation of the base of tower is 259m and the relief displacement 'd' is measured as 54.1 mm. The radial distance to the top of the tower is 121.7 mm. What is the height of the tower?

Question 5 [10+5+10 marks]

a. With the help of a sketch, explain the term 'Parallactic angle' and state how it affects object distances.

b. What is 'Parallax?'

c. Elevation of point C is given as 200.00m above sea level and parallax bar reading r(c) = 11.89 mm. Assuming that a pair of overlapping photos were taken from H = 1000m, constant of parallax bar C = 80.71mm and parallax bar reading of point A is equal r(a) = 10.96 mm. Calculate the elevation of point A.