

## 14. ASSIGNMENT TOPICS WITH MATERIALS

### UNIT 1

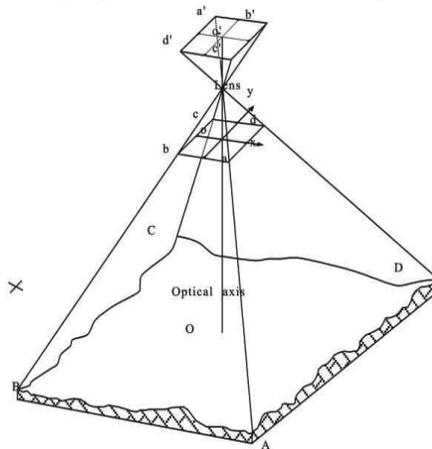
1. The geometry of a vertical aerial photograph with a neat sketch
2. planning and execution of aerial photography
3. Write a brief note on stereoscopic parallax
4. What are the major advantages of digital images over traditional hard copy images
5. Explain the fields of applications of Photogrammetry

#### 1. The geometry of a vertical aerial photograph with a neat sketch

**Ans:**

Geometry of Vertical Photograph

ABCD is the terrain which is photographed, a'b'c'd' is the negative obtained during the photography.



- L: the camera lens exposure
- $f$ : the lens focal length
- X-axis: the forward direction of the flight
- Y-axis:  $90^\circ$  counter clock wise from the positive x-axis
- O: the ground principal point
- $ABCD \leftrightarrow abcd \leftrightarrow a'b'c'd'$

The geometry of the photography can be known during flight planning. Aerial cameras are therefore have their focus fixed for infinite object distances.

The aerial photograph is taken by means of an aerial camera on board aircraft / space craft at an altitude based on the scale needed for the given application. The geometry of the photograph is often controlled by the application, scale, size and the condition of the terrain.

Aerial cameras are therefore have their focus fixed for infinite object distances.

### **Fiducial Marks:**

Camera fiducial marks, impressions of holdings, appear on the photograph in the shape of 'V' or 'W' are usually four or eight in number.

The fiducial marks are situated in the middle of the sides of the focal plane resulting an impressions on the negative when the picture is taken. The line joining opposite fiducial axes is called the principal point.

## **2. Planning and execution of aerial photography**

**Ans:**

### **Aerial Photography - Planning and Execution**

For successful execution of any project based on the aerial photography proper planning and execution of aerial photography mission is required.

The specification for aerial photography is based on the following item variables:

**Purpose of photography:** The first and foremost consideration is the purpose for which the photography is taken. For topographic mapping photos having good metric qualities are needed.

**Scale of photography:** Average photo scale is one of the most important variables that must be selected in Aerial photography planning. In most of the photogrammetric instruments the enlargement ratio from photo scale to map scale is five.

**End lap and side Lap:** For topographic mapping and photogrammetric control extension the end lap is 60% and the side lap is 30%. The side lap is required for tying the strips and making the block for the specified area.

**Flying Height:** Once the selection of the camera and scale of photography is finalised, the flying height for the project is determined.

**Ground Coverage:** Once the photo scale and camera format dimensions are selected the ground surface area covered by a single photograph can be calculated.

**Weather Conditions:** The weather for aerial photography is an important consideration cloud less days have sky and atmosphere clear without haze smoke are chosen for flight.

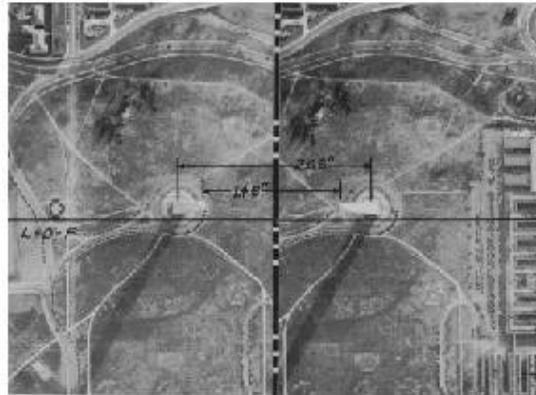
**Season of the year:** Normally start of the winter season is chosen in for aerial photo missions, for topographic mapping the season to be chosen in based on altitude of sun and the trees having leaves fallen or intact.

**Flight Map:** The flight map gives the project boundaries and flight lines the pilot must fly to obtain the desired coverage. Flight maps are prepared on existing maps covering the project area.

### 3. Write a brief note on stereoscopic parallax

**Ans:** The displacement of an object caused by a change in the point of observation is called parallax. Stereoscopic parallax caused by taking photographs of the same object but from different points of observation.

Adjacent but overlapping aerial photos are called stereopairs and can be used to measure object height



Note the displacement between the top and base of monument in this stereopair.

#### Calculating object heights using Stereoscopic parallax:

Absolute parallax-the average photo base length= average distance between PP and CPP

Differential parallax-the difference between the stereoscopic parallax at top and base of the object.

### 4. What are the major advantages of digital images over traditional hard copy images

**Ans:**

- Digital photography is a form of photography that uses an array of light sensitive sensors to capture the image focused by the lens, as opposed to an exposure on light sensitive film. The captured image is then stored as a digital file ready for digital processing (colour correction, sizing, cropping, etc.), viewing or printing.
- Until the advent of such technology, photographs were made by exposing light sensitive photographic film and used chemical photographic processing to develop and stabilize the image. By contrast, digital photographs can be displayed, printed, stored, manipulated, transmitted, and archived using digital and computer techniques, without chemical processing.
- Digital photography is one of several forms of digital imaging. Digital images are also created by non-photographic equipment such as computer tomography scanners and radio telescopes. Digital images can also be made by scanning conventional photographic images. Hard copy documents are extremely difficult to maintain.

- The actual physical task for maintaining paper documents is very labour-intensive as well as requiring a great need for storage space when filed. Additionally, gaining access to stored hard-copy documentation is quite tedious and annoying at best.

### **5. Explain the fields of applications of Photogrammetry**

**Ans:**

In the field of Photogrammetry, Intec Info.com provides services in photogrammetry using Satellite images as well as aerial photographs. Thus enabling the user base to make use of and analyze the data in a heterogeneous environment for:

- Aerial photography interpretation
- Stereo-pair digital orientation
- Digital aerial photography geographical mosaic
- Digital aerial photography rectification and geometric correction
- Building height measurement by digital stereo aerial photography
- Spot height extraction by digital stereo aerial photography
- Contour line generation by digital stereo aerial photography
- Digital terrain model generation by digital satellite stereo-pair

Satellite photogrammetry, which uses images from earth observation satellites, makes it possible to determine the shape, dimensions and positions of observed phenomena in a given reference system. It applies the same rigor as digital photogrammetry based on aerial photography with accuracy that depends on data resolution.

Satellite photogrammetry has been a major step forward in the mapping as it facilitates to map large areas with very few images taken by satellites and is cost effective compared with aerial photography. Aerial Photogrammetry can be used to scan a particular extent of area and the image specifications like scale, camera, time of photograph etc can be manipulated.