2007

REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM

PAPER—II (MOD-4 8s 5)

Full Marks : 100

Time : 4 hours

The figures in the *right-hand margin indicate full marks.*

Candidates ***are required*** to *give their answers in their own words* as *far* as *practicable.*

Illustrate *the answers wherever necessary.*

Write the answers of questions for each *modules in* separate books.

MODULE - 4

(Full Marks : 50)

Photogrammetry (Introduction & Geometry of Aerial Photography)

Answer *four* questions selecting two from each group.

Group-A **15x2**

1. **Illustrate** with the help of a neat flow diagram of the process for colour formation on the final positive print starting with a colour IR film. Describe various filters combinations in connection with aerial photography. 8+7

2. Draw the characteristics curve in connection with photo/film development and explain the following terms from the curve :

   (a) Film density, (b) Gamma, (c) Film speed, (d) Exposure latitude and its radiometric resolution. 7+2+2+2+2

3. **Define Photogrammetry. What are the various requirements for stereoscopic vision? What are the** different **types of distortions** in an ordinary **nadir-looking perspective aerial photographs ?**

   Find **out the height of a tower shown in a single aerial photograph** with the following **information :**

   Flying height of the aircraft above the base of the tower = 1500m, **Relief displacement measured from the photo =** 2.55 mm, **Radial distance from the photo principal point to the top of the tower** = 70.45 **mm.** **2+3+5+5**

4. **Write short notes on** 3x5

   (**a**) **Orthorectification.**

   (**b**) **Coordinate system in Photogrammetry.**

   (**c**) **Relief Distortion.**

   (**d**) **Camera calibration.**

   (**e**) **Ground coverage of aerial photograph.**

Group-B **10x2**

5. **What is the ground resolution for aerial photographs acquired at a height of 5000m with a camera having a system resolution of 30 line-pairs/mm and a focal length of 304 mm ? What is the minimum ground separation? What is the scale of the photograph ?** **5+3+2**

6. **A study area is 10 km wide in the east-west direction and 16 km long in the north-south direction. A camera having focal length of 152.4 mm is to be used. The desired photo scale is 1 : 25,000 and the nominal forward overlap and** side overlap are to be 60% and 30% respectively. The **average terrain height is 300m. Work out the computation** necessary to develop a flight plan. 10

7. Discuss on 5x2

(a) Structural & operation of a colour IR film.

(b) Relative **orientation** and Absolute **orientation.**

8. Write short notes on 2x5

(**a) Image parallax.**

(b) Large format **camera.**

(c) Orthophoto.

(**d) Image plane and focal plane.**

(**e) Oblique photograph.**

MODULE - 5

(Full Marks : 50)

(Stereo photogrammetry, Analytical and Digital photogrammetry)

Answer *four* questions selecting *two* from each group.

Group-A

1. Write a short note on 5x3

(a) Analytical Aerotriangulation & bundle adjustment.

(b) Floating mark principle in parallax bar measurement.

(c) Soft copy plotter.

(d) Collinearity condition in Analytical Photogrammetry.

(e) Human stereoscopy and depth perception.

2. What is image parallax ? How can the difference in elevation between two points be measured from their parallax difference on stereo pairs. Derive the parallax height equation with proper diagram. 5+10

3. Why are the ground control points necessary for aerial survey ? State the traditional and contemporary survey methods for establishing horizontal & vertical ground control. 5+10

4. Why are stereoscopic plotting instruments used in photogrammetry ? Describe three basic components of a stereoplotter. 3+12

Group-B

Answer any *two* questions.

5. Compare analog & digital photogrammetry. How is digital elevation model derived from digital orthophotor ? 5+5

6. What is photo-mosaic ? Elucidate three different kinds. of photo-mosaic. 3+7

7. What is. photogrammetric work-station ? Discuss the capacity of hardware & software system for spatial data capture, manipulation, analysis & output generation in photogrammetric work-station. 3+7

8. (a) What is Y-Parallax ? What are the major **causes of parallax in a stereo**-model? 2+3

   (b) Calculate the approximate vertical **exaggeration in a** stereomodel from photos taken with a 15.5 cm focal length camera having a 23 cm square format. Assume that the photos are taken at a flying height of 2500m above ground. 5