

02 MAY 2023

Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 2023

Label : B.E.

Year : III

Exam Roll No. :

Time: 30 mins.

Course : GEOM 316

Semester: I

F. M. : 10

Registration No.:

Date :

SECTION "A"

[20 Q × 0.5 = 10 marks]

Encircle the most appropriate answer among the given options.

1. Pick the correct statement on the principle of Photogrammetry.
- The departures from the central projection can be modelled as random errors in the collinearity condition.
 - There is deviation of light rays passing through the camera lens.
 - The camera is assumed to produce a perfect orthogonal projection.
 - The principle of collinearity embraces three translations and three rotations as the degree of freedom of the camera.

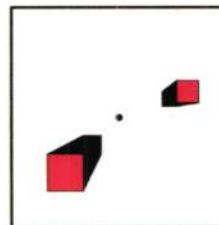
2. Identify the type of image shown.
- A Nadir Aerial Image
 - A Low Oblique Aerial Image
 - A High Oblique Aerial Image
 - A Satellite Image



horizon

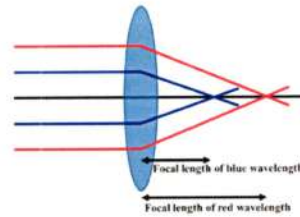
3. An optical axis of a camera lens _____.
- is the line passing through the optical centre of the camera lens and it is perpendicular to the photo plate
 - is the line passing through the optical centre of the camera lens and it is perpendicular to the negative
 - is the line passing through the optical centre and front and rear nodal points
 - exactly coincides with the camera axis
4. Photographs are taken using a camera with a focal length and a sensor width of 25mm each. If the photographs have 2500×2000 (w × h) pixels, calculate the GSD of the photographs if the flying altitude is 100m.
- a. 4 cm/pixel b. 8 cm/pixel c. 16 cm/pixel d. 32 cm/pixel
5. Suppose an aeroplane is capturing images from a flying height of 5000m, if the differential parallax between the top and the bottom of a tower is measured as 0.6cm and average image base length is 4.4 cm. The height of the tower would be _____m.
- a. 200 b. 400 c. 600 d. 800

6. _____ is an attachment or facility on a camera that operates the shutter regularly at set intervals over a period.
 a. Intervalometer b. View Finder c. Film Magazine d. Mount
7. Suppose one hundred images has to be captured in a drone flight. If images have 2048×2048 pixels and a radiometric resolution of 8 bits is used for 3 bands, a _____ memory stick will be required.
 a. 4GB b. 8 GB c. 16GB d. 32GB
8. Which of the following is **INCORRECT** regarding Fiducial marks?
 a. They are marks on camera image plate.
 b. They are transferred to the image film when exposed to light.
 c. There exists odd number of such marks.
 d. They are used for camera calibration and interior orientation.
9. Suppose high-accuracy DTM is required for an irrigation planning of a 60 sq km municipality in Terai. Which of the following technology would be the best?
 a. Field Surveying with a Total Station
 b. Aerial Surveying with optical imaging sensor
 c. Drone LiDAR Survey
 d. Manual digitization of Topographic maps
10. Which of the following does not possess a 3D Coordinate System in Photogrammetry?
 a. Real World Coordinate b. Digital Image Coordinate System
 c. Digital Camera System d. Object Coordinate System
11. The depth can not be perceived monoscopically _____.
 a. on the basis of relative size of the object b.
 b. by analyzing hidden objects
 c. through shadows
 d. to estimate it more accurately
12. An aerial photograph has _____.
 a. a uniform scale b. an orthogonal projection
 c. symbology d. an original radiometric property
13. _____ influence the geometric quality of orthophoto.
 a. DTM accuracy b. dynamic range of the scanner
 b. radiometric enhancement d. sharpness of the film diapositive
14. Which projection does the figure represent?
 a. Central projection
 b. Orthogonal projection
 c. Map like projection
 d. Isometric projection

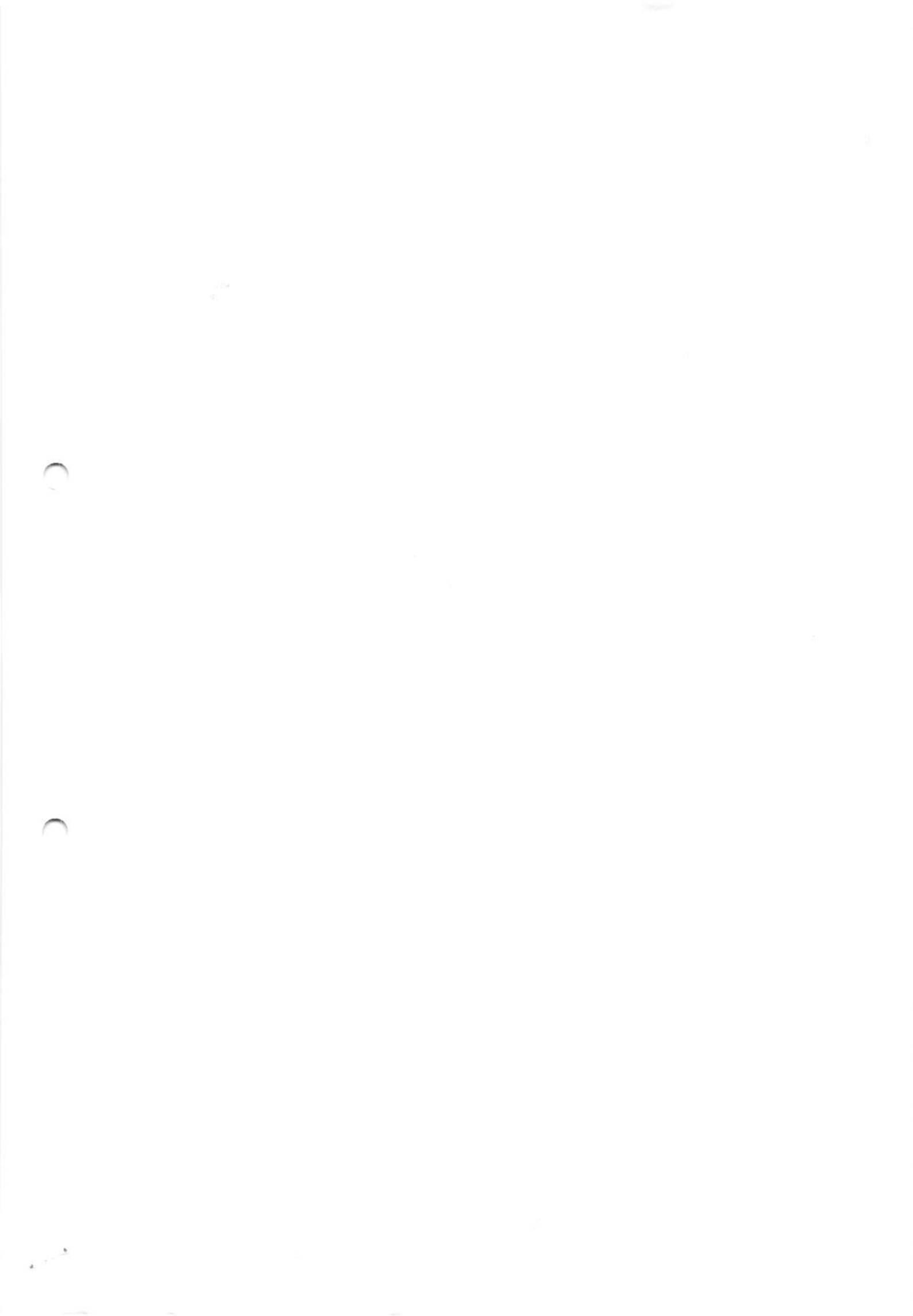


15. Calculate the number of images required to cover an area of $50 \times 50 \text{ km}^2$ if the scale of the photograph be 1: 20,000 and the photograph format is $23 \text{ cm} \times 23 \text{ cm}$. Consider the forward overlap and the sidelap as 70% and 50% respectively.
- a. 900 b. 600 c. 300 d. 100

16. The figure below depicts _____.
- a. Barrel distortion
b. Coma
c. Chromatic aberration
d. Pincushion distortion



17. A 2D affine coordinate transformation has _____ parameters.
- a. 3 b. 4 c. 6 d. 7
18. A relative orientation finds solution for _____ parameters.
- a. three b. four c. five d. six
19. _____ solves for camera internal parameters.
- a. Block Adjustment with Self Calibration
b. Block Adjustment by Independent Models
c. Resection
d. Polynomial Strip and Block Adjustment
20. Which of the following makes image matching faster?
- a. Correlation coefficient
b. Image Pyramid
c. DSM
d. Extracting and matching features from Topographic maps



KATHMANDU UNIVERSITY
End Semester Examination [C]
December 2022

02 MAY 2023

Label : B.E.
Year : III
Time : 2 hrs. 30 mins.

Course : GEOM 316
Semester: I
F. M. : 40

SECTION "B"
[6 Q × 4 = 24 marks]

Attempt ANY SIX questions. Assume data wherever necessary.

1. Describe types of aerial photographs. Explain forward overlap and endlap with necessary diagrams. [2 + 2]
2. Explain area based image matching with an example. [4]
3. How is feature extraction used in topographic mapping? Explain image interpretation. [2 + 2]
4. What is parallax in Photogrammetry? How does it help in estimating height of an object from aerial images? Illustrate with an example. [4]
5. How does epipolar constraint help image matching? Illustrate with an example. [4]
6. Explain relative orientation with necessary diagrams. [4]
7. Illustrate radial distortion in aerial images. How is lighting condition important in Terrestrial Photogrammetry? [2 + 2]

SECTION "C"
[2 Q × 8 = 16 marks]

Attempt ALL questions.

8. How is an orthophoto different from an aerial photograph? Discuss radiometric problems for image mosaic and your recommendations for its quality improvement. How does error in DTM influence the quality of orthophoto? Illustrate with a diagram. [2 + 3 + 3]
9. Describe pre-pointing of GCPs. For a photograph with exterior orientation ($1.5^\circ, 2^\circ, 89.5^\circ$), camera center at (15500, 14000, 2500)m, and camera parameters $(x_0, y_0, f) = (-0.022, -0.032, 151.70)$ mm, calculate the coordinates of image of the ground point (15200, 13900, 850) m, in the fiducial based system. [2 + 6]

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