KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B.E.
Year : III

Course : GEOM 316
Semester: I

Exam Roll No.:

Time: 30 mins.

F.M. : 10

Registration No.:

Date : MAR 05 2018

SECTION "A"
[20 Q.×0.5=10 marks]

Choose the most appropriate answer among the given options.The symbols have usual meaning.

1. A vertical photograph is taken at an altitude of 800m above sea level. The terrain is flat and has an elevation of 250m. If the camera focal length is50mm, what is the scale?
   a) 16000 b) 11000 c) 1:16000 d) 1:11000

2. Which of the following is false?
   a) For aerial cameras, the principal distance is equal to the focal length
   b) For close-range cameras, the principal distance is greater than the focal length
   c) The distance from the perspective center to the image plane measured along magnetic north is principal distance
   d) PPA stands for Principal point of autocollimation

3. The flying height above the base of anobject is 400m for a vertical image. If the object top is 80mm away from center of the image and distance between top and base of the object is 4mm, the height of the object is
   a) 20m b) 20cm c) 80m d) 80cm

4. Which of the following is true?
   a) $p = (H-h)/Bf$ b) $p = [(H-h)/B]*f$
   c) $p = Bf/(H-h)$ d) $p = [b\Delta h/(H-h)]*f$

5. A ray of light travels from glass with a refractive index of 1.4 into air, with assumed refractive index of 1.0. If the angle of incidence is 30°, what is the angle of refraction?
   a) 44.4° b) 45.6° c) 21° d) 69°

6. Super-wide-angle lens has _____.
   a) roughly the same cone of vision that the human eye does
   b) field of view of approximately 30°
   c) field of view of approximately 90°
   d) field of view from 110° to 130°

7. Exterior orientation parameters include _____.
   a) exposure station coordinates and (ω, Φ, k)
   b) (X, Y, Z) and (ω, Φ, k)
   c) (x, y, z) and (ω, Φ, k)
   d) exposure station coordinates and camera parameters

8. Absolute orientation establishes_____.
   a) three translations and three rotations
   b) a uniform scale, three translations and three rotations
   c) a variable scale, three translations and three rotations
   d) two scales, three translations and three rotations

9. Which of the following is not used to model the elevation of the terrain?
   a) Spot height b) Hillshade c) Viewshade d) Layer tints

10. Which of the following provides the highest level of DTM accuracy?
   a) Digitizing existing maps b) Laser scanning
   c) Radar d) Photogrammetry

11. Which of the following filter is used to reduce the effect of uneven distribution of incoming light?
   a) NIR blocking filter b) Yellow filter
   c) Anti-vignetting filter d) Blue filter

12. How many gray levels are there to display the brightness/color of a pixel with 8 bits per pixel?
   a) 247 b) 255 c) 256 d) 257

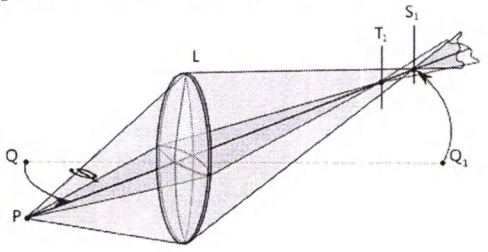
13. _____ is not required for Differential rectification.
   a) Digital photographs b) Camera calibration data
   c) Elevation data d) Check points

14. Which of the following influences radiometric quality of orthophotos?
   a) Accuracy of image orientation b) Dynamic range of the scanner
   c) DTM accuracy d) Output scale and pixel size

15. The minimum number of GCPs required for image orientation is_____.
   a) 1 b) 2 c) 3 d) 4

16. X, Y, Z coordinates of a _____ is unknown.
   a) Ground Control Point b) Check Point
   c) Pointcloud d) Tie Point

17. The following figure depicts the .....lens detect.



a) Astigmatism
b) Chromatic Aberration
c) Coma
d) Spherical aberration

18. Which of the following is true for Terrestrial Photogrammetry?
a) It is highly accurate
b) It is generally manual
c) It uses metric camera
d) It uses linear solution

19. Tick the incorrect statement.
a) Higher the film speed, shorter the exposure time
b) Bigger the silver grains, more light energy is required
c) Higher the film speed, less bright the objects
d) Bigger the silver grains, higher the film speed

20. RMK C1 camera was developed in _____.
a) 1918 b) 1922 c) 1956 d) 1989

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SECTION "B"
[6 Q.×4=24 marks]

Attempt ANY SIX questions.

1. Describe interdependence among Photo Scale, Flight Height and Focal Length of camera. [4]

2. Explain relationship between Relief displacement &Obscured area with necessary diagram and mathematical support. How is addition of perspective centers as tie points is crucial for strength of the solution of Block Adjustment by Independent Models? [2+2]

3. Compare CCD Sensor with Film. What is the effect of platform stability on image quality? [3+1]

4. What is Accommodation? Compare monocular vision with Stereoscopic vision. [1+3]

5. What is parallax? Derive a formula to estimate height of an object using stereoscopic parallax. [1+3]

6. Explain differential rectification process with flow diagram and equations. [4]

7. Describe the things to be avoided while capturing images for Terrestrial Photogrammetry. [4]

SECTION "C"
[2 Q.×8=16 marks]

Attempt ANY TWO questions.

8. Compare Pinhole camera with lens camera. For a photograph with exterior orientation parameters (4, -3, 87) degrees and (13000, 12000, 4000) meters, and camera parameters (0.005, -0.002, 152.6) mm, compute via the collinearity equations the coordinates of the ground point (12200, 11700, 300) meters in the fiducial based image system. [3+5]

9. How does the use of image pyramid make searches faster? Explain with an example. Compare cross correlation and least square matching methods. [4+4]

10.a. Explain Absolute Orientation in detail with necessary mathematical support. [3]

b. A project area is 20km long in the east-west directions and 13km in the north-south direction. The client asked for natural color (3 bands) vertical digital aerial imagery with a pixel resolution of 1m using a frame-based digital camera with a rectangular CCD array of 12,000 pixels across the flight direction (W) and 7,000 pixels along the flight direction (L) and a lens focal length of 100mm. The array contains square CCDs with a dimension of 10 microns.The end lap and side lap are to be 60% and 30%, respectively. The imagery should be delivered in tiff file format with 8 bits per pixel per band. Calculate: [5×1=5]

i. number of flight lines necessary to cover the project area
ii. total number of digital photos
iii. net ground coverage of each image
iv. storage requirements in gigabytes aboard the aircraft required for storing the imagery
v. flying altitude