Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination
February/March 2019

Label : B.E.
Year : III
Course : GEOM 316
Semester: I

Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date : 17 FEB 2019

SECTION "A"
[20 Q × 0.5 = 10 marks]

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

1. _____ is a large camera, fixed over a ground station to take the photographs of the extra-terrestrial bodies.
   a) Terrestrial Camera
   b) Aerial Camera
   c) Stereometric Camera
   d) Ballistic Camera

2. Scale varies due to relief displacement and tilt displacement in _____.
   a) Aerial Photograph
   b) Map
   c) True Ortho-photo
   d) Ortho-photo

3. What process are you undertaking when you look carefully at a photograph to find out what it shows?
   a) Evaluating
   b) Interpreting
   c) Observing
   d) Recording

4. Which two sources of information would you use if you were an engineer choosing a place to build a new bridge across a river?
   a) A topographic map and a vertical aerial photograph
   b) A ground level photograph and a street directory
   c) An oblique aerial photograph and a vertical aerial photograph
   d) A topographic map and a précis map

5. Which type of photograph gives the best impression of the shape and size of the area being photographed?
   a) A vertical aerial photograph
   b) An analogue photograph
   c) An oblique aerial photograph
   d) A ground level photograph

6. What does the scale of a vertical aerial photograph depend on?
   a) The angle at which the photograph was taken
   b) The type of land or water surface that was photographed
   c) The type of camera used to take the photograph
   d) The height from which the photograph was taken

7. For a camera with focal length 152.4 mm and the standard 23 cm format size, what height above ground is necessary for a vertical photograph to cover an area of 3 km by 3 km?
   a) 2 km
   b) 4 km
   c) 200 m
   d) 400 m

8. If images captured by tourists are used for preparation of 3D model, self-calibration parameters should apply to _____.
   a) individual images
   b) flight lines
   c) sub-blocks
   d) entire block

9. Which of the following is used to estimate height of an object?

a) $\Delta r \times s$ b) $H\frac{\Delta r}{r}$ c) $H\frac{r}{\Delta r}$ d) $H\frac{\Delta r}{f}$

10. Relating an image coordinate system to the camera coordinate system is known as _____.

a) Relative Orientation
b) Absolute Orientation
c) Interior Orientation
d) Exterior Orientation

11. Camera calibration determines _____.

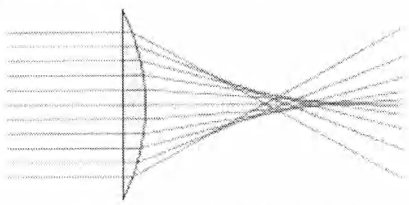
a) Equivalent Foal Length
b) Equivalent Focal Length and FOV
c) Equivalent Focal Length, FOV and Principal Point Coordinates
d) Equivalent Focal Length, Principal Point Coordinates and Lens Distortion Parameters

12. Which of the following is TRUE?

a) The properties of eye to change the focal length to view the different objects at varying distance is called accommodation
b) If the light intensity is low, the aperture of pupil gets smaller
c) The maximum parallactic angle formed by human eyes is approximately 25^0
d) When a distant object is viewed, the focal length of human eye is decreased

13. The following figure depicts _____lens detect.

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



14. Which of the following is true about differential rectification?

a) Corrects for Camera Tilt
b) Utilizes DSM
c) Uses Affine Transformation
d) Corrects for Relief Displacement

15. Which of the following is true?

a) There exists no hidden area in conventional orthophoto
b) There exists no doubly mapped area in conventional orthophoto
c) Conventional orthophoto is geometrically correct over in the entire image
d) True orthophoto is geometrically correct over in the entire image

16. Choose the correct statement.

a) Focal length divided by diameter of lens opening is called f-stop
b) Focal length divided by diameter of lens opening is called brightness factor
c) Illuminating area is inversely proportional to image distance
d) Illuminance is proportional to illuminated area

17. A yellow filter _____.

a) Absorbs red light
b) Absorbs green light
c) Absorbs blue light
d) Absorbs cyan light

18. _____ is a GCP which is used for cadastral application and network strengthening.
a) Road traffic signals
b) Road crossing
c) Corners
d) Beacon

19. Which of the following is correct regarding Terrestrial Photogrammetry?
a) Moving light sources must be used
b) Is highly accurate
c) Uses iterative solution
d) Uses amateur cameras

20. What does the inner orientation of camera define in photogrammetry imaging process?
a) Location of object points in space
b) Geometric parameters of the imaging process
c) View direction
d) Finding fixed points

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SECTION "B"
[6 Q × 4 = 24 marks]

Attempt *ANY SIX* questions. Assume data wherever necessary. Figures in the margin indicate full marks.

1. Compare and contrast type of Aerial Photographs. How can height of an object be measured from a single photograph? [2 + 2]

2. Can depth be perceived by monoscopic vision? Explain. Describe features of stereoscopic vision. [2 + 2]

3. Describe with necessary diagrams Spherical aberration and Chromatic aberration. [2 + 2]

4. How is True Ortho-photo different than Conventional Ortho-photo? How does DTM accuracy influence the quality of ortho-photo? [2 + 2]

5. How is parallax used in Photogrammetry? Explain with a numerical example. [1 + 3]

6. Define Spectral Sensitivity of emulsion. How can Vignatting effect be reduced? [2 + 2]

7. Write short note on [*ANY TWO*]: [2 × 2 = 4]
   i. Coordinate System in Photogrammetry
   ii. Methods of camera calibration
   iii. Things to avoid in Terrestrial Photo Acquisition

SECTION "C"

Attempt *ALL* questions. Figures in the margin indicate full marks.

8. A project area is 2 km long and 1.5 km wide. RGB vertical digital aerial images with GSD of 4 cm using a frame-based digital camera with a rectangular CMOS sensor of 4096 pixels across the flight direction (W) and 2160 pixels along the flight direction (L). The forward and side overlaps are to be 80% and 60%, respectively. The imagery should be delivered in JPEG file with 8 bits per band. Calculate: [6 × 1 = 6]
   i. the number of flight lines necessary to cover the project area if the flight direction was parallel to the east-west boundary of the project. Assume that the first flight line falls right on the southern boundary of the project.
   ii. the total number of digital photos (frames).
   iii. the ground coverage of each image in acres.
   iv. the storage requirements in gigabytes aboard the aircraft required for storing the imagery.
   v. time between two consecutive images if the aircraft speed was 10 m/s.
   vi. draw the flight plan.

9. How does the use of Epipolar geometry make searches faster? Discuss the problems in image matching. [4 + 6]

OR

Describe the issues of incorporating GPS positions into Block Adjustment with necessary mathematical support. Derive Collinearity Equations with necessary diagram. Also, write inverse form of Collinearity Equations. [5 + 5]