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CHAPTER

Aerial Surveying

Q.1 If the difference in height of two points whose parallax difference is (+) 0.8 mm on a pair of stereo pair taken from a flying height H and having mean photo base 95.2 m is (+) 100 m, then the flying height H will be

(a) 8,000 m   (b) 10,000 m
(c) 12,000 m   (d) 14,000 m

Q.2 Which one of the following indicates the correct relationship between the flying height (H), the focal length (f), the air base (B) and the photographic base (b)?

(a) $B = \dfrac{f}{bH}$ (b) $B = \dfrac{bH}{f}$

(c) $B = \dfrac{b}{fH}$ (d) $B = \dfrac{H}{bf}$

Q.3 The parallax equation $\Delta_p = \dfrac{Bm\Delta h}{H-h}$ is applicable to entire overlap of the photograph only if parallax is measured

(a) normal to base line
(b) parallel to base line
(c) both (a) and (b)
(d) neither (a) nor (b)

Q.4 If v, f and $\dfrac{f}{H}$ are the ground speed of the aircraft, the shutter speed of the camera and the scale of the photograph respectively, then the amount of image displacement

(a) $i = \dfrac{v.t.H}{f}$ (b) $i = \dfrac{v.f}{t.H}$

(c) $i = v.t.\dfrac{f}{H}$ (d) $i = \dfrac{tH}{vf}$

Q.5 Match List-I (Variables used in stereo-photogrammetry) with List-II (Values of the variable)s and select the correct answer using the codes given below the lists:

List-I
A. The normal longitudinal overlap along the flight line
B. The normal overlap between the adjacent strips
C. Eye base (average) assumed
D. Tolerable difference in scale of adjoining photographs

List-II
1. At least 20%
2. Upto 15%
3. 60% or more
4. 64 mm

Codes:

	A	B	C	D
(a)	1	3	2	4
(b)	3	1	2	4
(c)	1	3	4	2
(d)	3	1	4	2

Q.6 Match List-I (Elements of aerial photogrammetry) with List-II (Explanation of the elements) and select the correct answer using the codes given below the lists:

List-I
A. Perspective centre
B. Plumb point
C. Principal point
D. Isocentre

List-II
1. The point where the perpendicular from the optical centre of the lens meets the photograph
2. The point where the rays from the objects converge
3. The point where the vertical through the optical centre meets the photograph
4. The point where the horizontal through optical centre meets the photograph
5. The point where the bisector of the angle between vertical and perpendicular from optical centre meet the photograph

Codes:

	A	B	C	D
(a)	2	4	1	3
(b)	2	1	3	5
(c)	2	3	1	5
(d)	4	3	1	2

Q.7 Match List-I (Name) with List-II (Explanation) with respect to aerial photogrammetry and select the correct answer using the codes given below the lists:

List-I
A. Principal point
B. Isocentre
C. Crab
D. Drift

List-II
1. The angle formed between the flight line and the edges of photograph in the direction of flight
2. Failure of the aeroplane to stay on the predetermined flight line
3. The point where a perpendicular dropped from the front nodal point strikes the photograph
4. The point at which the bisector of the angle of tilt meets the photograph

Codes:

	A	B	C	D
(a)	4	3	2	1
(b)	4	3	1	2
(c)	3	4	1	2
(d)	3	4	2	1

Q.8 Assertion A : Every point on the aerial photograph, which is displaced from its true orthographic position, is called relief displacement.

Reason R : Relief displacement increases as the distance from the principal point decreases.

(a) both A and R are true and R is the correct explanation of A
(b) both A and R are true but R is not a correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.9 A vertical photograph was taken from an aircraft flying at an altitude of 2000 m above mean sea level. The focal length of the camera is 175 mm. The scale of the photograph for a hill of an elevation of 250 m is

(a) 1/10000   (b) 1/150000
(c) 1/200000   (d) 1/25000

Q.10 In an aerial photograph, if the photograph has a tilt of 3° and the focal length is 100 mm, then the distance between the perspective centre and the plumb point will be

(a) $100\tan 3°$ (b) $100\cos 3°$
(c) $100/\sin 3°$ (d) $100/\cos 3°$

Q.11 In an aerial photograph, if the photograph has a tilt of 4° and the focal length is 200 mm, then the distance between the principal point and plumb point will be

(a) $200\tan 4°$ (b) $200\cos 4°$
(c) $200/\sin 4°$ (d) $200/\cos 4°$

Q.12 An aircraft is flying at a ground speed of 200 km/h. The focal length of the camera is 2000 mm. The ground distance covered is 200 mm. The ground distance covered along the flight line between exposures is 2 km. The time interval between exposures is given by

(a) 18 sec   (b) 36 sec
(c) 72 sec   (d) 180 sec

Q.13 If f is the focal length, t is the angle of tilt, then the distance of isocentre on the principal line from the principal point is

(a) $f\tan t$ (b) $f\tan t/2$
(c) $f\cot t$ (d) $f\cot t/2$

Q.14 An image of the top of the hill is 95 mm from the principal point of the photograph. The elevation of the top of the hill is 500 m and the flying height

is 4000 m above the datum. The relief displacement will be

(a) 768 mm   (b) 88 mm
(c) 12 mm   (d) 8 mm

Q.15 If an overlapping pair of vertical photographs taken with a 150 mm focal length camera has an air base of 2100 m and the elevation of the control point 'A' on it is 900 m above M.S.L. and the parallax of the point is 75 mm, then the flying height above M.S.L. of the stereopair will be

(a) 3000 m   (b) 3150 m
(c) 5100 m   (d) 5250 m

Q.16 In an aerial photo, the image of the top of a tower is found to be 10 cm from the center of the photograph. If the height of the tower is 100 m and the flying height of the aircraft is 1000 m above the average terrain height, then the height displacement of the image from the true position will be

(a) 10 mm   (b) 20 mm
(c) 50 mm   (d) 100 mm

Q.17 In photogrammetric surveying, the image of the top of the hill is 90 mm from the principal point of the photograph. If the elevation of the top of the hill is 500 m and the flying height is 5000 m above datum, then the relief displacement is

(a) 0.9 mm   (b) 9 mm
(c) 90 mm   (d) 900 mm

Q.18 Given that
Scale of photograph is 1 cm = 100 m
Size of photograph = 23 cm × 23 cm
Area to be covered = 150 sq. km
Longitudinal overlap = 60%
Side overlap = 30%
The total number of photographs required for covering the above area is

(a) 143   (b) 102
(c) 58   (d) 43

Q.19 If the parallax difference between the top and bottom of a tree is measured as 1.32 mm on a stereo-pair of photos taken at 3000 m above ground and the average photo base is 66 mm, then the height of the tree will be

(a) 45.40 m   (b) 60.00 m
(c) 23.51 m   (d) 39.50 m

Q.20 Given that
Scale of the photograph, 1 cm = 50 m
Size of photograph = 18 cm × 18 cm
Percentage longitudinal overlap = 60%
Percentage side overlap = 33%
Covered area = 108 sq km
The required number of photograph will be

(a) 200   (b) 400
(c) 500   (d) 600

Q.21 Images of two objects on a pair of photograph have a parallax difference of 1.8 mm and an average photograph base of 88.2 mm. The flying height is 4000 m above the average ground level. The difference in elevation of the two objects would be

(a) 40 m   (b) 60 m
(c) 80 m   (d) 90 m

Q.22 A tower appears in two successive photograph taken an altitude of 400 m above datum. The focal length of the camera is 160 mm. The length of the air base is 300 m. The parallax for the top and bottom of the pole are 72 mm and 63 mm respectively. The height of the top of the tower above its bottom is nearly

(a) 63 mm   (b) 72 mm
(c) 95 mm   (d) 135 mm

Q.23 The tilt displacement in an aerial photograph is radial from

(a) Plumb point   (b) Isocentre point
(c) Principal point   (d) Nadir point

Q.24 In an aerial photograph, if the average photo scale is 1 in 22000, the focal length of the camera lens is 20 cm, the flying height above datum is 5000 m, the average terrain elevation above datum should be:

(a) 600 m   (b) 550 m
(c) 500 m   (d) 450 m

Q.25 In aerial photogrammetry, the longitudinal overlap between two consecutive photographs is kept between

(a) 40% and 60%   (b) 50% and 80%
(c) 70% and 90%   (d) 55% and 65%

Q.26 An imaginary line lying throughout on surface of the earth and preserving a constant inclination to the horizontal is called as

(a) contour line   (b) contour gradient
(c) level line   (d) line of gentle slope

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Answers   Arial Surveying

1. (c)	2. (b)	3. (b)	4. (c)	5. (d)	6. (c)	7. (c)	8. (c)	9. (a)	10. (d)
11. (a)	12. (b)	13. (b)	14. (b)	15. (c)	16. (a)	17. (b)	18. (b)	19. (b)	20. (c)
21. (c)	22. (d)	23. (b)	24. (a)	25. (a)	26. (b)				

Explanations   Arial Surveying

12. (b)

Time interval between exposures (sec) $= \dfrac{3600 L}{V}$

where L is ground distance covered between exposures along the flight line in km and V is the ground speed of the aircraft in km/h.

$$= \dfrac{3600 \times 2}{200} = 36 \text{ sec}$$

18. (b)
Ground length covered
$= 100 \times 23(1 - 0.6) = 920$ m
Ground width covered
$= 100 \times 23(1 - 0.3) = 1610$ m
Net ground area covered by one photograph
$= 100 \times 1610 \text{ m} = 1.48$ sq km

Hence number of photograph $= \dfrac{150}{1.48} = 101$

19. (b)
The height of tree is given by

$= \dfrac{3000 \times 132}{66} = 60$ m

20. (c)
Ground length covered
$= 50 \times 18 (1 - 0.6) = 360$ m
Ground width covered
$= 50 \times 18 (1 - 0.33) = 603$ m
∴ No. of photographs

$$= \dfrac{108 \times 10^6}{360 \times 603} = 497.5 \simeq 500 \text{(say)}$$

24. (a)

Scale of photograph $= \dfrac{1}{22000}$

$\dfrac{f}{H - h} = \dfrac{1}{22000}$

$\dfrac{0.20}{5000 - h} = \dfrac{1}{22000}$

$5000 - h = 0.20 \times 22000$

$5000 - h = 4400$

$h = 5000 - 4400$

$h = 600$ m

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