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Internal Assesment Test –2

Sub:Advanced Surveying				Code: 15CV46
Date:16/04/2018	Duration: 90 mins	Max Marks: 50	Sem: IV	Sections:CV (A & B)

Answer ***any five*** questions. Good luck!

		Marks	OBE	
			CO	RBT
1	Define the terms: (i) Celestial sphere (ii) Hour angle (iii) Prime vertical (iv)Latitude (v) Longitude.	10	2,3	L1,L2
2	Briefly explain the rules to be followed in drawing the diagrams of a heavenly body in altitude and azimuth system.	10	2,3	L1,L2
3	Find the shortest distance between two places K and L given that the latitude of K and L are 12°00' N and 13°04' N respectively and their longitudes are 72°30' E and 80°12' E respectively.	10	2,3	L1
4.	The declination of a star is 48°46' N and the upper transit is in the Zenith of the place. Find the altitude of the star at the lower transit.	10	2,3	L1
5	Define aerial photogrammetry. Also describe the uses of the same.	10	2,3	L1,L2
6	With a neat sketch, derive the expression for the scale of a vertical photograph.	10	2,3	L1,L2
7.	A line AB 2000m long, lying at an elevation of 500m measures 8.65cm on a vertical photograph whose focal length of the camera is 20cm. Determine the scale of the photograph in an area the average elevation of which is 800m.	10	2,3	L1

2nd Internal Assessment Test - 19/4/2018.
Scheme and Solution. Advanced Surveying - 15CV46

Qn.(1) (i) Celestial Sphere: The imaginary sphere on which the stars appear to lie is called Celestial Sphere. the centes of the earth is taken as the Centes of Celestial Sphere. (02M)

(ii) Hour angle (H): It is the angle b/w the observers meridian and the declination circle passing thro' the body. (02M)

(iii) prime vertical: It is the vertical circle which passes thro' the east and west points of the horizon. It is at 90° to the meridian of the place. (02M)

(iv) Latitude: It is the angular distance measured from the equator towards the nearer pole along the meridian of the place. (02M)

(v) Longitude (ϕ): It is the angular measure of the arc of the equator between a fixed meridian and the meridian of the place. (02M)

Qn.2. (i) Draw a circle and mark Z & Z_1 on the same.
(ii) Draw the horizon and mark E/W according to the position of the body in the Eastern or western Hemisphere.
(iii) Mark North and South as per usual convention.
(iv) Mark the Celestial pole P on the vertical circle ZN at the given latitude NP = θ.
(v) Draw the vertical circle ZYZ_1 thro' the heavenly body y. Here ∠PZY is called Azimuth of the body and (10M)

lies b/w 0° to 180°.

Let θ = latitude of the observer

ZP = Co-latitude = $(90° - \theta)$

$PN = ZN - ZP = 90° - (90° - \theta) = \theta$.

∴ Latitude of observer = altitude of the pole.

QN. 3. In the Spherical Δle PKL,

PK = 90° - Lat of K

$PK = 90° - 12° = 78°$

PL = 90° - Lat of L

$PL = 90° - 13°4' = 76°56'$

$$\cos \widehat{LK} = \frac{\cos \widehat{LP} - \cos \widehat{LP} \cdot \cos \widehat{PK}}{\sin \widehat{PL} \cdot \sin \widehat{PK}}$$ (04M)

$$= \frac{\cos 7°42' - \cos 78° \cos 76°56'}{\sin 78° \sin 76°56'} = 0.99072$$

$\widehat{LK} = \cos^{-1}(0.99072) = 7.8123°$

Distance $\widehat{LK} = R\theta = (6370\ km) * \frac{\pi}{180°} * 7.8123° = 868.54\ km$ (06M)

QN. 4. $\delta = 48°46'\ N$, $\theta = ?$

$\theta > \delta$ or $\delta < \theta$. ∴ Zenith distance $ZK = 0$.

Polar distance = $KP = ZP$ = Colatitude

∴ $KP = ZP = (90° - \theta)$

∴ $90° - \delta = 90° - \theta$ or $\delta = \theta$. (04M)

at lower transit, $2k_1 = zp + pk_1$

$= (90^\circ - \theta) + (90^\circ - \delta)$

$= 180^\circ - \theta - \theta = 180^\circ - 2\theta$

$= 180^\circ - 2\delta = 180^\circ - 2(48^\circ 46')$

$= 82^\circ 28'$

Altitude = 90° − Zenith distance = $90^\circ - 82^\circ 28' = 7^\circ 32'$ (06M)

Qn.5. It is that branch of photogrammetry where in photographs are taken by a camera mounted in an aircraft which flies over the area. (04M)

Uses: (i) Construction of planimetric and topographic maps

(ii) Soil classification and geological interpretation.

(iii) Military intelligence

(iv) preparation of composite pictures of ground. (06M)

Qn6. Let H = height of exposure station

(C) above msl.

f = focal length of camera

h = height of ground above datum

S = Scale of photograph. (04M)

In the figure, A and A_0 are vertically above each other and are represented by

a' and a_o in the photograph.

By property of Similar Δ^{les},

$$\frac{ok}{of} = \frac{fa}{KA} = \frac{oa}{OA}$$

$$\Rightarrow \frac{f}{H-h} = \frac{\text{map distance}}{\text{ground distance}} = S'$$

$$\therefore S' = \frac{f}{(H-h)}$$

06M

QN7. $$S = \frac{\text{photo distance}}{\text{map distance}} = \frac{8.65\text{cm}}{2000\text{m}} = \frac{1\text{cm}}{231.21\text{m}} = \frac{1}{23121}$$

$$S = \frac{f}{H-h} = \frac{0.20}{(H-500)} = \frac{1}{23121}$$

04M

$$H-500 = 4624.28 \quad \text{or} \quad H = 5124.28\text{m}.$$

★ For the second case, $H = 5124.28\text{m}$, $h = 800\text{m}$, $S = ?$

$$S = \frac{f}{(H-h)} = \frac{0.20}{(5124.28-800)} = \frac{1}{21621.4} = \frac{1\text{cm}}{216.21\text{m}}$$

06M