CLASS TEST

S.No. : 03IGCE_GHIJ_24062024

MADE EASY
India's Best Institute for IES, GATE & PSUs

Delhi | Bhopal | Hyderabad | Jaipur | Pune | Kolkata

Web: www.madeeasy.in | **E-mail:** info@madeeasy.in | **Ph:** 011-45124612

SURVEYING

CIVIL ENGINEERING

Date of Test : 24/06/2024

ANSWER KEY ➤

1.	(b)	7.	(d)	13.	(d)	19.	(c)	25.	(d)
2.	(c)	8.	(a)	14.	(b)	20.	(c)	26.	(a)
3.	(b)	9.	(b)	15.	(c)	21.	(b)	27.	(d)
4.	(d)	10.	(a)	16.	(a)	22.	(c)	28.	(a)
5.	(c)	11.	(c)	17.	(d)	23.	(b)	29.	(b)
6.	(c)	12.	(a)	18.	(b)	24.	(a)	30.	(d)

DETAILED EXPLANATIONS

1. (b)

Chain surveying is used for securing data for exact description and marking of the boundaries of a piece of land or for preparing the maps of the area to show various details. It is generally used for plans of estates, fields, etc. on a large scale when the area is small in extent and the ground is fairly level and open.

The cross-staff survey is a special type of chain survey conducted to locate the boundaries of a field for the purpose of determining the area of the field.

2. (c)

$$\text{Height of lighthouse (in m)} = 0.0673 \times D^2 \qquad (D \text{ in km})$$
$$= 0.0673 \times (40)^2 = 107.68 \text{ m}$$

3. (b)

Reciprocal levelling is method of levelling in which the difference in elevation between two points which are at considerable distance is to be determined accurately and when it is not possible to setup the level midway between the two points. Reciprocal levelling eliminates the errors due to:

(i) Refraction

(ii) Inclination of line of collimation

(iii) Curvature

4. (d)

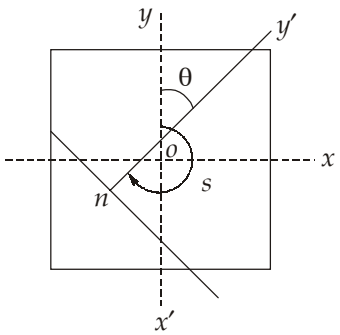
Photomaps are the aerial photographs which are used as a suitable for maps. The photomap may consist of one photograph, but usually photomaps are obtained by assembling two or more photographs to form a large map.

The large photomaps from two or more photographs are called mosaics. To varying degree of accuracy, a mosaic is a map substitute.

The mosaic has an overall average scale comparable to the scale of a planimetric map.

5. (c)

The seeing angle (s) is the clockwise angle measured in the plane of photograph from the positive y-axis the photographic nadir point (n)



Thus, the rotation angle, $\theta = s - 180°$

$= 230° - 180° = 50°$

6. (c)

7. (d)

$$A = a^2$$
$$\partial A = 2a\,\partial a$$
$$= 2 \times 200 \times 0.04 = 16\ \text{m}^2$$

8. (a)

CP will be after 2.405 and 1.780 readings

RL of last point

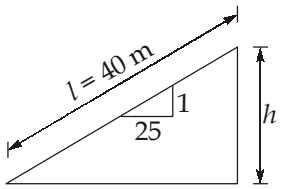
$$= 75 + 0.655 - 2.405 + 0.430 - 1.780 + 0.305 - 1.355$$
$$= 70.850$$

9. (b)

Many a times, the direction of first traverse line is taken as arbitrary meridian.

10. (a)

11. (c)



$$\text{Slope correction} = \frac{h^2}{2l}$$

Difference in elevation between points,

$$h = \frac{1}{\sqrt{25^2 + 1^2}} \times 40 = 1.598 \simeq 1.6\ \text{m}$$

$$\therefore \quad \text{Slope correction} = \frac{(1.6)^2}{2 \times 40} = 0.032\ \text{m} = 3.2\ \text{cm}$$

12. (a)

For area as given by Trapezoidal method is

$$A = d\left[\frac{(O_0 + O_n)}{2} + O_1 + O_2 + \ldots O_{n-1}\right]$$

Now, since d is not constant

$$\therefore \quad A_1 = 5\left[\frac{4 + 4.7}{2} + 6 + 7.5 + 6.3\right] = 120.75\ \text{m}^2$$

$$A_2 = 10\left[\frac{4 + 4.7}{2} + 3.5\right] = 68.5\ \text{m}^2$$

$$A = A_1 + A_2$$

$= 120.75 + 68.5 = 189.25\ m^2$

13. (d)

First RL = 51.45 m

Last RL = 63.5 m

ΣBS = 87.755 m

ΣFS = 73.725 m

where there is no error, then

ΣBS – ΣFS = Last RL – First RL

The difference between LHS and RHS is the closing error of the work.

ΣBS – ΣFS = 87.755 – 73.725 = 14.03 m

Last RL – First RL = 63.5 – 51.45 = 12.05 m

Closing error = 14.03 – 12.05 = 1.98 m

14. (b)

Area, $A = a^2$

$\partial A = 2a\,\partial a$

$= 2 \times 250 \times 0.05$

$= 25\ m^2$

15. (c)

We have, $\Delta h = \dfrac{H \times \Delta p}{b + \Delta p}$

where, H = Height of datum

Δp = Parallax difference between two points

Δh = Elevation difference between two points

b = Photograph base

But here, $\Delta p = +0.75$ mm

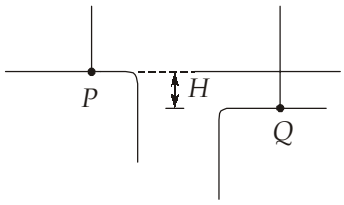
$b = 94.25$ mm

$\Delta h = 100$ m

$$H = \frac{\Delta h(b + \Delta p)}{\Delta p} = \frac{100(94.25 + 0.75)}{0.75}$$

$= 12666.67$ m

16. (a)



Using reciprocal levelling, $H = \dfrac{(Q_1 - P_1) + (Q_2 - P_2)}{2}$

$= \dfrac{(2.205 - 1.475) + (2.060 - 1.44)}{2}$

$= 0.675$ m

If instrument is at P then true reading at Q will be

$Q_1^T = P_1 + H = 1.475 + 0.675 = 2.15$ m

So, Collimation error = Measured value – True value

$= 2.205 - 2.15 = 0.055$

17. (d)

True bearing = Magnetic bearing – Declination (west)

$= 320°30' - 3°30' = 317°0'$

The true bearing of a line is constant,

So the present true bearing of line is also 317°0'.

$\therefore$ Present magnetic bearing = True bearing – Declination (East)

$= 317°0' - 4°15' = 312°45'$

18. (b)

$HI = RL + BS$

and $RL = HI - BS$

Staff station	BS (m)	IS (m)	FS (m)	HI (m)	RL (m)
A	1.545	–		101.545	100
B	–0.860	–	–1.420	102.105	102.965
C	–	–	0.835	–	101.27

$\therefore$ RL of C = 101.27 m

19. (c)

$\because \quad \alpha = \dfrac{(s)}{(n)D} \times 206265'' \qquad \left[\alpha = \dfrac{30''}{2}\right]$

$\Rightarrow \quad 15 = \dfrac{s}{2 \times 80} \times 206265''$

$\Rightarrow \quad s = 0.0116$ m

$\simeq 1.16$ cm

20. (c)

Prismoidal formula is also known as Simpson's rule for volumes.

Given, $2L = 6$ m; $L = 3$ m

$A_1 = 6 \times 4 = 24$ m^2

$A_2 = 4 \times 2 = 8$ m^2

$A_m = \left(\dfrac{6+4}{2}\right) \times \left(\dfrac{4+2}{2}\right) = 15$ m^2

$$\therefore \quad V = \frac{L}{3}(A_1 + 4A_m + A_2)$$
$$= 24 + (4 \times 15) + 8 = 92\ \text{m}^3$$

21. (b)

When the instrument is at A,

Apparent difference in elevation between A and B = 2.60 – 1.30 = 1.30 m

When the instrument is at B,

Apparent difference in elevation = 2.40 – 0.80 = 1.60 m

$\therefore$ True difference in elevation = $\frac{1.30 + 1.60}{2} = 1.45\,\text{m}$

22. (c)

23. (b)

24. (a)

$$N_1 = \frac{L_1}{(1-P)sl} + 1 = \frac{20000}{(1-0.6)\times 100 \times 25} + 1$$
$$N_1 = 21$$
$$N_2 = \frac{L_2}{(1-P_w)sw} + 1 = \frac{20000}{(1-0.3)\times 100 \times 25} + 1$$
$$N_2 = 12.43 \simeq 13$$
$$N = N_1 N_2 = 21 \times 13 = 273$$

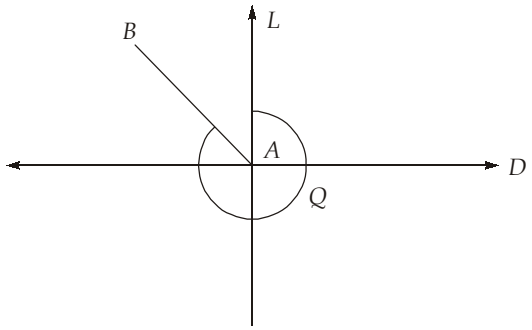
25. (d)

Scale of chords is used to measure an angle.

26. (a)

27. (d)

$\therefore \quad \Sigma L$ = Positive and ΣD = Negative



Error of closure will be between 270° to 360°.

28. (a)

$$\text{Refraction correction} = \frac{1}{7}C_c$$
$$= 0.0112\ d^2$$
$$= 0.0112 \times 2^2$$
$$= 0.0448\ \text{m}$$
$$\text{Corrected staff reading} = 1.155 + 0.045 = 1.200\ \text{m}$$

29. (b)

$$\text{Most probable error of mean, } E_m = \frac{E}{\sqrt{n}}$$
$$\Rightarrow \quad n = \left(\frac{E}{E_m}\right)^2 = \left(\frac{0.08}{0.04}\right)^2$$
$$n = 4$$

30. (d)

In prismatic compass, whole circle bearing are calculated.

■■■■