GEOMATICS ENGINEERING TEST 1

Number of Questions: 25 **Time: 60 min.**

Directions for questions 1 to 25: Select the correct alternative from the given choices.

1. What is the principle of surveying?
(A) Working from part to whole
(B) Working from whole to part
(C) Working from higher to lower
(D) Working from lower to higher

2. An offset is measured with an accuracy of 1 in 40. If the scale of plotting is 1 cm = 30 m, the limiting length of offset, so that the displacement of point on paper from both sources of error may not exceed 0.025 mm, is _____.
(A) 21.3 m (B) 21.4 m
(C) 21.2 m (D) 21.8 m

3. The whole circle bearing of $S\ 31°\ 36^1E$ is _____
(A) $138°\ 24^1$ (B) $158°\ 24^1$
(C) $128°\ 24^1$ (D) $148°\ 24^1$

4. If the image formed by the objective lens is not in the same plane with cross hairs, then it is known as
(A) focusing of eye piece
(B) focusing of objective
(C) parallax
(D) aberration

5. The automatic check for leveling in case of height of instrument method is
(A) ΣB.S – ΣF.S = Last RL – First R.L.
(B) ΣB.S – ΣF.S = ΣRise – Σfall.
(C) ΣRise – Σfall = last 1 – First RL.
(D) None of the above.

6. A line lying throughout the surface of the ground and preserving a constant inclination to the horizontal is
(A) contour gradient.
(B) horizontal equivalent.
(C) contour interval.
(D) vertical control.

7. Surveyor's chain consists of 100 links along a length of
(A) 100 ft long (B) 33 ft long
(C) 66 ft long (D) 50 ft long

8. Correction for temperature in a chain when the temperature at field is more than the standard temperature is _____
(A) additive
(B) negative
(C) constant
(D) None of the these

9. In surveyor's compass the graduation are in
(A) whole circle bearing
(B) quadrantal bearing
(C) both whole circle bearing and quadrantal bearing
(D) None of the above

10. Small scale representation of map is known as
(A) scale (B) plan
(C) grid (D) survey map

11. The sag correction for a 30 m steel tape under a pull of 200 N in four equal spans of 8 m each. The weight of one cubic cm of steel = 0.078 N and area of c/s of tape = 0.08 sqm.
(A) 3.9N (B) 4.2N
(C) 4.99N (D) 4.6N

12.

Point	Co-ordinates N	E
A	O	O
B	3014	256
C	1764	1398
D	–	–

A straight tunnel is to be run between two points *A* and *B* whose co-ordinates are as given above.
The length and bearing of *CD* if *D* is the midpoint of *AB*, are _____.
(A) $74°\ 38^1$, 1380.2 m
(B) $75°\ 39^1$, 1278.4 m
(C) $78°\ 34^1$, 1295.7 m
(D) $76°\ 32^1$, 1287.6 m

13. In leveling between two points *A* and *B* on opposite banks of a river, the staff readings at *A* and *B* were 1.295 and 2.960 m respectively. The level was then removed and set up near *B* and the readings on *A* and *B* were 0.56 and 2.42. The true difference of levels between *A* and *B* is __.
(A) 3.486 m (B) 3.525 m
(C) 3.538 m (D) 3.624 m

14. The perpendicular offsets at 20 m intervals from survey line to an irregular boundary lines are 3.25, 5.6, 4.2, 6.65, 8.75, 6.2, 3.25, 4.2, 5.65. The area enclosed between survey line by the application of trapezoidal rule is _____.
(A) 820 m^2 (B) 833 m^2
(C) 860 m^2 (D) 866 m^2

15. An observation with a theodilite given staff readings of 1.052 and 2.502 for angles of elevation gave 8% and 6% respectively. The vertical angle was 5.25%. The horizontal distance of staff station if the instrument elevation is 942.5 m is _____
(A) 48 m (B) 52 m
(C) 56 m (D) 50 m

16. The following are bearings in closed traverse.

Line	FB	BB
AB	80° 10¹	259° 0¹
BC	120° 20¹	301° 50¹
CD	170° 50¹	350° 50¹
DE	230° 10¹	49° 30¹
EA	310° 20¹	130° 15¹

The interior angles between the bearings are _____.
(A) 50°, 65.3°, 230.5°, 100°, 123°
(B) 50.5°, 138.40°, 131°, 120.40°, 99.10°
(C) 53°, 48.4°, 123.2°, 121°, 100.10°
(D) 58°, 62.5°, 73o, 148°, 133°

17. In order to find the difference in elevation between two points *P* and *Q*, a level was set upon line *PQ*; 40 meters from *P* and 1.280 m from *Q*. The readings obtained on shaft kept at *P* and *Q* were 0.525 m and 4.92 m. respectively. The true difference in elevation between *P* and *Q* is _____.
(A) 3.87 m (B) 4.82 m
(C) 4.39 m (D) 4.31 m

18. Match the following.

1.	Vertical axis	i.	Axis about which telescope rotates in vertical plane
2.	Turnion axis	ii.	Line passing through intersection of horizontal and vertical cross hairs and optical center
3.	Line collination	iii.	Axis about which instrument rotates in horizontal plane
4.	Axis of level tube	iv.	Line tangential to longitudinal curve of level tube at its center

(A) (1 – ii), (2 – iii), (3 – i), (4 – iv)
(B) (1 – iv), (2 – i), (3 – iii), (4 – ii)
(C) (1 – iii), (2 – i), (3 – ii), (4 – iv)
(D) (1 – iii), (2 – iv), (3 – ii), (4 – i)

19. A surveyor measured the distance between two points on plan drawn to a scale of 1 cm = 30 m and the result was 500 m. Later it was discovered that 1 cm = 10 m scale was used. The true distance between the points would be _____.
(A) 168.3 m (B) 165.6 m
(C) 162.3 m (D) 166.6 m

20. (i) The durinal variation is the departure of the destination from its mean value a during a period of 24 hrs.
(ii) The variation which has a yearly period is known as annual variation.
(A) (i) is true.
(B) (ii) is true.
(C) Both (i) and (ii) are true.
(D) Both (i) and (ii) are false.

21. Match the following

	Purpose of survey		Scale
1.	Building site	i.	1 cm = 50 mts 200 m
2.	Location survey	ii.	1 cm = 10 m or less
3.	Town planning	iii.	1 cm = 50 m to 100 m

(A) (1 – ii), (2 – iii), (3 – i)
(B) (1 – iii), (2 – ii), (3 – i)
(C) (1 – ii), (2 – iii), (3 – i)
(D) (1 – i), (2 – ii), (3 – iii)

22. Two straight lines intersect at an angle of 50°. The radius of curve joining the two straight lines is 400 m. The length of long chord and mid ordinates in meters is. _____.
(A) 337.8 m, 36.8 m (B) 340.6 m, 38.3 m
(C) 338.09 m, 37.47 m (D) 360.7 m, 35.6 m

23. During the leveling work along a falling gradient using a dumpy level and staff of 3 m length, the following successive readings are taken:
1.623, 2.789, 0.260, 1.520.
What will be the correct order of booking these four readings in level book?
(A) *BS*, *FS*, *BS*, *FS* (B) *BS*, *IS*, *FS*, *FS*
(C) *BS*, *IS*, *IS*, *FS* (D) *BS*, *IS*, *BS*, *FS*

24. The bench mark with reduced level (*RL*) = 156.305 m has been established at the floor of a room. It is required to find the *R.L* of the underside of root. Back slight (BS) is 1.8 m whereas the Foresight (*FS*) is 0.675, The *R.L* will be _____.
(A) 152.3 m (B) 159.8 m
(C) 158.7 m (D) 153.3 m

25. *A*: Radiation method of plane table survey is employed for locating the details.
R: Radiation method is suitable when distances are small.
(A) *A* and *R* are true and *R* is the correct explanation of *A*.
(B) *A* and *R* are true *R* is not the correct explanation of *A*.
(C) *A* is true and *R* is false.
(D) *A* is false and *R* is true.

Answer Keys

1. B	**2.** C	**3.** D	**4.** C	**5.** A	**6.** A	**7.** C	**8.** A	**9.** B	**10.** B
11. C	**12.** C	**13.** B	**14.** D	**15.** D	**16.** B	**17.** A	**18.** C	**19.** D	**20.** C
21. A	**22.** C	**23.** A	**24.** C	**25.** B					

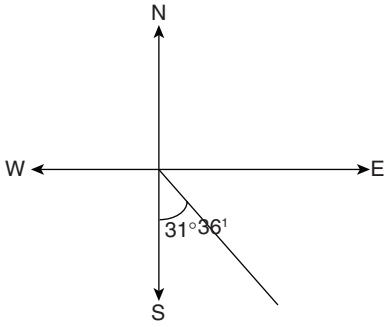
Hints and Explanations

2. Total displacement of paper $= \frac{\sqrt{2}L}{rs}$ cm

$$\frac{\sqrt{2}L}{rs} = 0.025$$

$$L = \frac{0.025}{\sqrt{2}} \times 40 \times 30 = 21.21 \text{ m.}$$ Choice (C)

3.



WCB $= 180° - R.B$
$= 180° - 31° 36^1$
$= 148° 24^1$ Choice (D)

11. Volume of tape/m $= 0.08 \times 200 = 16 \text{ m}^3$.
Weight of tape/m $= 16 \times 0.078 = 0.624$N.
Total weight of tape between two supports $= 0.624 \times 8$
$= 4.992$N. Choice (C)

12. Since D is midway between A and B, its co-ordinates are 1507 and 128
Latitude of $AD = 1507$.
Departure of $AD = 128$.
Latitude of $AC = 1764$.
Departure of $AC = 1398$.
Latitude of $DC = 1764 - 1507 = 257$.
Departure of $DC = 1398 - 128 = 1270$.
$\therefore$ Latitude of $CD(_L) = -257$.
Departure of $CD(_D) = -1270$.

Bearing of $CD = \tan\theta = \frac{D}{L} = \frac{1270}{257}$

$\Rightarrow \theta = 78° 34^{1.}$

Length of $CD = \sqrt{D^2 + L^2}$

$= \sqrt{1270^2 + 257^2}$

$= 1295.7$ m. Choice (C)

13. When instrument is at A.
$2.96 - 1.295 = 1.665$ m.
When instrument is at B.
$2.42 - 0.56 = 1.86$ m.

True difference in elevation $= \frac{1.665 + 1.86}{2}$

$= 3.525$ m. Choice (B)

14. According to trapezoidal rule

$$\Delta = \left(\frac{O_o + O_n}{2} + O_1 + O_2 + O_3 + ... O_{n-1}\right) \times d$$

$$\Rightarrow \left(\frac{3.25 + 5.65}{2} + 5.6 + 4.2 + 6.65 + 8.75 + 6.2 + 3.25 + 4.2\right)$$

$\times 20 = 866 \text{ m}^2$. Choice (D)

15. $\tan\propto_1 = 0.06$, $\tan\propto_2 = 0.08$.
Horizontal distance

$$D = \frac{S}{\tan\propto_1 - \tan\propto_2} = \frac{2.502 - 1.502}{0.08 - 0.06}$$

$= 50$ m. Choice (D)

16. $\angle A$ = Bearing of AE – Bearing of AB
$= 130° 15^1 - 80° 10^1 = 50° 5^1$.
$\angle B$ = Bearing of BA – Bearing of BC
$= 259 - 120° 20^1 = 138° 40^1$
$\angle C$ = Bearing of CB – Bearing of CD
$= 301° 50^1 - 170° 50^1 = 131° 0^1$
$\angle D$ = Bearing of CD – Bearing of DE
$= 350° 50^1 - 230° 10^1 = 120° 40^1$
$\angle E$ = Bearing of ED – Bearing of EA
$= 49° 30^1 - 310° 20^1 + 360° = 99° 10^1$ Choice (B)

17. Combined correction for Q
$= 0.067828 (1.280)^2 = 0.110$m (subtractive)
Correct staff reading at Q
$= 4.92 - 0.525 = 4.395$ m
Difference in elevation between P and Q
$= 4.395 - 0.525 = 3.87$ m. Choice (A)

19. Measured length $= 500$ m.

$R.F$ of wrong scale $= \frac{1}{30 \times 100} = \frac{1}{3000}$.

RF of correct scale $= \frac{1}{10 \times 1000} = \frac{1}{1000}$.

$$\therefore \text{ Correct length} = \left(\frac{\frac{1}{3000}}{\frac{1}{1000}}\right) \times 500$$

$= 166.6$ m. Choice (D)

22. $\Delta = 50$, $R = 400$ m,
Length of long chord $= 2RS \text{ in } \frac{\Delta}{2}$

$= 2 \times 400 \times \sin\frac{50}{2} = 338.09$ m.

Length of midordinate $= R\left(1 - \cos\frac{\Delta}{2}\right)$

$= 400\left(1 - \cos\frac{50}{2}\right) = 37.47$ m. Choice (C)

24. $RL = 156.305 + 0.675 + 1.8 = 158.7$ m. Choice (C)