

2013 (A)

SURVEYING—II

akubihar.com

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
 (ii) There are **TEN** questions in this paper.
 (iii) Attempt any **FIVE** questions.

1. (a) What are different systems of coordinates used in astronomical surveying? Explain in brief, why it is necessary to have several systems instead of one.

7

- (b) The following traverse was conducted from a station A to a station E between which there are certain obstacles :

Line	Horizontal distance (m)	Azimuth
AB	351.3	N 82°28' E
BC	149.3	N 30°41' E
CD	447.3	S 81°43' E
DE	213.3	N 86°21' E

It is required to set out the midpoint of AE. Calculate the length and azimuth of a line from station C to the required point.

7

2. Find the latitude of a place from the following observations with respect to the sun :

14

Mean altitude of the lower limb was $48^{\circ}12'36''$. Declination was $26^{\circ}36'18.4''$ S at 0 hour, increasing at the rate of $11.2''$ per hour. The equation of time was 8 m, 31.2 sec, decreasing at the rate of $1.3''$ per hour. The semidiameter correction for the sun was $15'21.2''$. The correction for refraction was $57'' \cot \alpha$ and correction for parallex was $8.8'' \cos \alpha$. The longitude of the place of observation was $106^{\circ}10'40''$ and the time of observation was 14 h 45 m 30 s.

3. (a) How would you determine the intensibility of triangulation station? Give in a tabular form the classification of triangulation systems based upon accuracy.

8

- (b) Explain satellite station and reduction to centre in geodetic surveying.

6

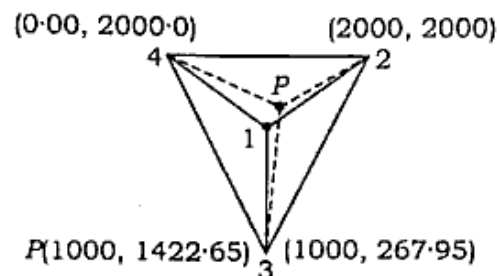
4. Stations 2, 3 and 4 as shown in figure have the following respective coordinates :

2000.00 m E ; 2000.00 m N ; 1000.00 m E ;
 267.95 m N ; 0.00 m E ; 2000.00 m N.

Station 1 was established very near to the centre of the circle which circumscribes stations 2, 3 and 4 and the following

readings were recorded by the theodolite setup at Station 1 :

Pointing on	Horizontal circle reading
2	00°00'00"
3	119°59'51"
4	240°00'23.5"



Determine the coordinates of Station 1. 14

5. The elevations of two triangulation stations A and B, 121 km apart are respectively 208 m and 1055 m above mean sea level. The elevations of two peaks C and D on the profile are respectively 362 m and 540 m, the distance being AC = 50 km and AD = 80 km. Ascertain, if A and B are intervisible and if necessary, find the minimum height of scaffolding at B, assuming A as ground station. 14

6. (a) Explain the following terms : 9

- (i) Most probable value and true value
- (ii) Cumulative errors and random errors
- (iii) Figure equation and side equation

- (b) Explain the basic features of a total station. 5



- (a) What is meant by scale and relief displacement on a vertical photograph? Develop an expression to explain them. 8

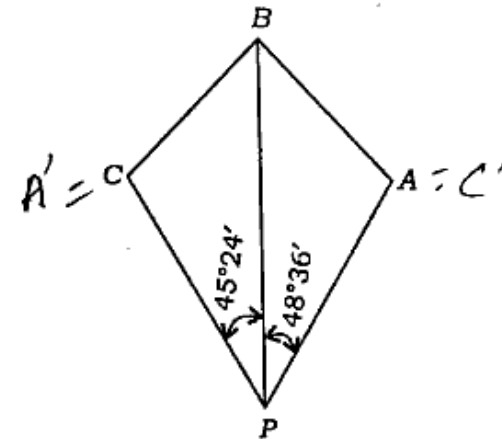
- (b) What are the principles of EDM? 6

8. The mean observed angles of a spherical triangle ABC are as follows :

$$\begin{aligned}\alpha &= 55^\circ 18' 24.45'' & \text{weight} &= 1 \\ \beta &= 62^\circ 23' 34.24'' & \text{weight} &= 2 \\ \gamma &= 62^\circ 18' 10.34'' & \text{weight} &= 3\end{aligned}$$

The length of the side BC was measured as 59035.6 m. If the mean radius of the earth is 6370 km, calculate the most probable values of the spherical angles. 14

9. A, B and C are three shore stations on a coastline as shown in figure and P is a sounding point at sea :



$AB = 400 \text{ m}$; $BC = 381 \text{ m}$; $\angle ABC = 122^\circ 30'$;
 $\angle APB = 48^\circ 36'$; $\angle BPC = 45^\circ 24'$.

A and C are respectively East and West of BP,
 B and P are respectively North and South of AC. Calculate the distances AP, BP and CP. 14

10. (a) Explain the principle of gyroscope. 4
 (b) What is the inertial positioning system? 4
 (c) What are the different types of waves used in EDM? Explain the characteristics of those waves. 6
