53 (CE 301) SUR-I

2018

SURVEYING–I

Paper : CE 301

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* In levelling between two points *A* and *B* on opposite banks of a river, the level was set up near *A*, and the staff readings on *A* and *B* were 1·285*m* and 2·860*m* respectively. The level was then moved and set up near *B* and the respective readings on *A* and *B* were 0·860*m* and 2·220*m*. Find the true difference of level between *A* and *B*. 6

   (b) Differentiate between Repetition method and Reiteration method. 6

(c) Explain *any four* uses of contour maps. 8

2. (a) Derive the expressions for height and distance of an object, when object and instrument sections are in the same vertical plane and instrument axes at very different levels. 10

(b) Discuss the importance of surveying in the field of civil engineering. 5

(c) Find the sag correction for a $30m$ steel tape under a pull of $8kg$ in three equal spans of $10m$ each. Weight of $1cm^3$ of steel = $7{\cdot}86g$. Area of cross-section of the tape = $0{\cdot}10cm^2$. 5

3. (a) To determine the elevation of the top of a flagstaff, the following observations were made :

Instrument Station	Reading on B.M. (m)	Angle of elevation	Remarks
A	1·266	10°48′	R.L. of BM
B	1·086	7°12′	= 248·362m

Stations A and B and the top of the flag-staff are in the same vertical plane. Find the elevation of the top of the flag-staff, if the distance between A and B is $50m$. 6

(b) Differentiate between contour interval and horizontal equivalent. Explain the characteristics of contours. 4+6

(c) Name the *two* methods of orienting a plane table and explain their procedures. 4

4. (a) Explain how the procedure of reciprocal levelling eliminates the effect of atmospheric refraction and earth's curvature as well as the effect of non adjustment of the line of collimation. 6

(b) The following bearings were observed with a compass :

AB	74°0′	*BA*	255°0′
BC	91°0′	*CB*	270°0′
CD	164°0′	*DC*	342°0′
DE	177°0′	*ED*	0°0′
EA	189°0′	*AE*	9°0′

Where do you suspect the local attraction? Find the correct bearings. 10

(c) A luminous object on the top of a hill is visible just above the horizon at a certain station at the sea-level. The distance of the top of the hill from the station is 40*km*. Find the height of the hill, take radius of earth, $R = 6370km$. 4

5. (a) What is three-point problem in plane table surveying? Explain the procedure by any one method. 10

(b) Explain the factors on which the choice of proper contour interval depends. 4

(c) What are the fundamental lines of a theodolite? Explain their desired relations with a neat diagram. 6

6. (a) Distinguish between Radiation and Intersection method in plane table surveying. 5

(b) In running fly-levels from a benchmark of R.L. 384·705, the following readings were obtained.

Backsight 3·215, 1·030, 1·295, 1·855

Foresight 1·225, 3·290, 2·085

From the last position of the instrument six pegs at 25 metres interval are to be set out on a uniformly falling gradient of 1 in 100, the first peg is to have R.L. of 384·500. Work out the staff readings required for setting the tops of the pegs on the given gradient. 10

(c) Explain the different methods used for interpolation of contours. 5

7. (a) Explain the following : 2×5

(i) Correction for curvature and refraction.

(ii) Advantages and disadvantages of plane table surveying.

(b) What are the different types of plane table used in plane table surveying, also explain their uses ? 6

(c) Differentiate between plane and geodetic surveying. 4