Code : 011404

B.Tech 4th Semester Examination, 2017

Field Measurement

Time : 3 hours   Full Marks : 70

Instructions :

(i)   There are **Nine** Questions in this Paper.

(ii)   Attempt **Five** questions in all.

(iii)   **Question No. 1 is Compulsory.**

(iv)   The marks are indicated in the right-hand margin.

1. Answer any seven of the following questions: 14

   (i)   The object of surveying is to prepare

      (a) drawing

      (b) cross-section

      (c) map

   (ii) The diagonal scale is used to read

      (a) one unit

      (b) two units

      (c) three consecutive units

(iii) Compensating error is proportional to

   (a) L.

   (b) sqrt of L.

   (c) L^2

(iv) A triangle is said to be well-conditioned when its angles should lie between

   (a) 30^0

   (b) 20^0 and 150^0

   (c) 15^0 and 135^0

(v) In an optical square, the mirrors are fixed at an angle of

   (a) 30^0

   (b) 45^0

   (c) 60^0

(vi) The main object of running a tie line is

   (a) to check accuracy of work

   (b) to take details of a nearby objects

   (c) to take an offset for detailed surveying

   (d) none of the above

(vii) In a prismatic compass, the zero is marked on the

   (a) north end

(b) south end

(c) west end

(viii) The BM fixed at the end of a day's work is called the

   (a) permanent BM

   (b) arbitrary BM

   (c) temporary BM

(ix) When contours of different elevation cross each other, it indicates a/an

   (a) vertical cliff

   (b) saddle

   (c) overhanging cliff

(x) In tangential tachometry the staff is held

   (a) inclined

   (b) normal to the line of sight

   (c) vertically

2. (a) Discuss the different errors in chaining.   6

   (b) A 30 m steel type was standardized at a temperature of $20°C$ and under a pull of 5 kg. the tape was used in catenary at a temperature of $25°C$ and under a pull of P kg. The cross-sectional area of the tape is 0.02 cm^2, and

its weight per unit length is 22 g/m, Young's modulus $= 2 \times 10^6 \text{ kg/cm}^2$, $\alpha = 11 \times 10^{-6}$ per $°C$. Find the correct horizontal distance if P is equal to (a) 5 kg and (b) 11 kg.

    8

3. (a) What are well-conditioned and ill-conditioned triangles?

    6

   (b) A rectangular plot of land of 0.45 hectare area is represented on a map by a similar rectangular area of 5 cm^2. Calculate the RF of the scale of the map. Draw a scale to read up to a single metre from the map. The scale should be long enough to measure up to 400 m (1 hectare $= 10,000 \text{ m}^2$)   8

4. (a) What is local attraction ? How is it detected and adjusted?   6

   (b) The table below shows readings in a compass survey. Find the local attraction, if any, at any station and also find the corrected bearing.   8

Line	FB	BB
AB	N 76° 00' E	S 76° 00' W
BC	N 47° 00' E	S 40° 00' W
CD	S 17° 00' E	N 10° 00' W
DE	N 32° 00' E	S 32° 00' W

5. (a) State the advantages and disadvantages of plane table survey over other types of survey. 7

(b) Describe the procedure of setting up the plane table over a station. 7

6. (a) When is reciprocal levelling done? Describe the method along with a sketch. 6

(b) The following set of observations were taken to reach a given point. Form this point onwards a rising gradient of 1 in 15 starts. Calculate the required staff reading for the remaining four points. These points were spaced at an equal distance of 10 m each. 8

SI No.	BS	IS	FS	RL	Remarks
1.	3.250			270.500	BM
2.	2.300		2.800		CP
3.		1.830			
4.		1.500			
5.	3.795		1.050		CP and given point slope starts,
6.		-			1st pt
7		-			2nd point
8.		-			3rd point
9.		-	-		4th point
				5	P.T.O.

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7. (a) What are the characteristics of contour lines? 6

(b) The following offsets were taken at 15 m intervals from a survey line to an irregular boundary line: 3.50, 4.30, 6.75, 5.25, 7.50, 8.80, 7,90, 6.40, 4.40, 3.25 m. Calculate the area enclosed between the survey line, the irregular boundary, and the first and last offsets, by using Simpson's rule. 8

8. (a) Describe the method of determining the constants of a tachometer from field measurement. 6

(b) In a tachometric survey the instrument had a multiplying constant of 100 and was fitted with an anallatic lens. The staff was held normal to the line of sight and the following observations were taken:

Instrument Station	Height of axis	Staff at	Vertical angle	Staff readings
O	1.6 m	BM	−3° O'	1.400, 2.140, 2.880
O	1.6 m	CP	+5° 20'	1.205, 1.795, 2.385
A	1.4 m	CP	−5° 30'	1.395, 2.010, 2.625

If the RL of the BM is 192.105m, calculate te RL of the station A. 8

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9. Write Short notes on any three: 14

(i) Ranging

(ii) Surveyor's Compass

(iii) Orientation

(iv) Tachometry

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