Code : 011404

B.Tech 4th Semester Exam., 2019

FIELD MEASUREMENT

(Surveying)

Time : 3 hours   Full Marks : 70

Instructions :

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

(ii) There are **NINE** questions in this paper.

(iii) Attempt **FIVE** questions in all.

(iv) Question No. **1** is compulsory.

1. Choose the correct answer from the given four options for any *seven* of the following :
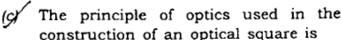
           2×7=14

(a) As per Indian standard, the length of one link in 30 m chain should be

   (i) 20 cm

   (ii) 30 cm

   (iii) 40 cm

   (iv) None of the above

(2)

(b) For accurate work, in comparison to chain, the steel band is used, because it

   (i) is light in weight

   (ii) is easy to handle

   (iii) is practically inextensible

   (iv) All of the above

(c) The principle of optics used in the construction of an optical square is

   (i) reflection

   (ii) double reflection

   (iii) refraction

   (iv) double refraction

(d) Invar tapes are made of an alloy of

   (i) nickel and steel

   (ii) copper and steel

   (iii) tin and steel

   (iv) aluminium and steel

(e) At the equator, the amount of dip is

   (i) 0°

   (ii) 45°

   (iii) 60°

   (iv) 90°

(f) The imaginary line joining the points of zero declination on the surface of the earth is called as

(i) isogonic line

(ii) isoclinic line

(iii) agonic line

(iv) magnetic declination line

(g) The two-point and three-point problems are methods of

(i) orientation

(ii) resection

(iii) traversing and resection

(iv) orientation and resection

(h) A relatively fixed point of known elevation above datum is called

(i) datum point

(ii) benchmark

(iii) reduced level

(iv) reference point

(i) The size of a theodolite is specified by

(i) the diameter of lower plate

(ii) the diameter of upper plate

(iii) the length of telescope

(iv) the diameter of vertical circle

(j) Tachometry is adopted where

(i) too many curves at the borders exist

(ii) obstacles and undulations exist

(iii) limitation of space exists

(iv) None of the above

2. (a) What are the principles of surveying? Discuss.

(b) Construct a diagonal scale to read up to 1 m for a scale 1 cm = 50 m and show thereon 74 m.   7+7

3. (a) What are the sources of error in chaining? What precautions would you take to avoid them?

(b) A chain line AB comes across a pond. Two points P and R are selected on the chain line on either side of the pond. A line PQ of 300 m length is set on the one side of the pond and another line PS of length 500 m is run on the opposite side of PQ. It is so aligned that the points Q, R and S are on the same straight line. Calculate the approximate length of the pond, if QR and RS are measured as 150 m and 250 m, respectively.   7+7

4. (a) What are obstacles of chaining and how are they overcome? Explain.

(b) The following consecutive readings were taken with a dumpy level :

0·875, 1·235, 2·310, 1·385, 2·930, 3·125, 4·125, 0·120, 1·875, 2·030, 3·765

The instrument moved after second, fourth and eighth readings. The first reading was taken on the staff held on the BM of RL 132·135 m. Calculate the RL of the points and applies the arithmetical check. 7+7

5. (a) What is local attraction? How does it affect survey being carried out? Discuss.

(b) The following bearings were observed in running a closed traverse :

Line	FB	BB
AB	124° 30′	304° 30′
BC	68°15′	246° 00′
CD	310° 30′	135°15′
DA	200°15′	17° 45′

At what stations do you suspect local attraction? Find the corrected bearings of the lines and also calculate the included angles of the traverse. 7+7

6. (a) What are the advantages and disadvantages of plane table surveying? Describe.

(b) Define and explain two-point problem in plane table surveying. How are they solved? 7+7

7. (a) What is a contour line? Describe with the help of sketches the characteristics of contour.

(b) The following consecutive readings were taken along AB with a 4 m levelling staff on a continuously sloping ground at an interval of 20 m :

0·345 on A, 1·450, 2·630, 3·875, 0·665, 1·745, 2·965, 3·945, 1·125, 2·475, 3·885 on B

The first reading was taken on the staff held on the BM of RL 60·350 m, i.e., the elevation of A. Calculate the RL of the points and also find the gradient of line AB. 7+7

8. (a) What are various methods employed in tacheometric survey? Describe the method most commonly used.

(b) To determine the multiplying constant of a tacheometer, the following observations were taken on a staff held vertically at distance, measured from the instrument :

Observation	Horizontal distance (in m)	Vertical angle	Staff reading
1	50	+3° 48′	0·500
2	100	+1° 06′	1·000
3	150	+0° 36′	1·500

The focal length of the glass is 20 cm and the distance from the object glass to the trunnion axis is 10 cm. The staff is held vertically at all these points. Find the multiplying constant.   7+7

9. (a) What are the fundamental lines of transit theodolite? Enumerate and explain. Also discuss temporary adjustment of a theodolite.

(b) A theodolite was set up at a distance of 200 m from a chimney and the angle of elevation to its top was 10°48′. The staff reading on a BM of RL 70·25 m with the telescope horizontal was 0·977. Find the reduced level of the top of the chimney.   7+7

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