B.Tech. 4th Semester Exam., 2014

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 most correct option from the following (any *seven*) :   2×7=14

   (a) The shrinkage factor of an old map is 24/25 and the RF is 1/2400. Then the corrected scale for the map is

      (i) 1/2400

      (ii) 1/2500

      (iii) 1/600

      (iv) 1/60000

   (b) The smallest length that can be drawn on a map is

      (i) 0·5 mm

      (ii) 0·2 mm

      (iii) 10 mm

      (iv) 15 mm

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(c) In a metric chain, the number of links per metre can be

   (i) 2

   (ii) 8

   (iii) 5

   (iv) 10

(d) Correction for slope is given by

   (i) $h^2/2L$

   (ii) h/L

   (iii) $h/2L$

   (iv) $2h^2/L$

(e) The whole circle bearing of a line whose quadrantal bearing is S 19°30′ E, is

   (i) 19°30′

   (ii) 199°30′

   (iii) 160°30′

   (iv) 340°30′

(f) Removal of parallax may be achieved by

   (i) refocussing the objective

   (ii) refocussing the eyepiece

   (iii) refocussing the eyepiece and the objective

   (iv) moving the shifting centre

(g) The coordinates of A are 100 (northing) and 200 (easting), whereas that of B are 100 (southing) and 200 (easting). The length AB is

   (i) 200 m

   (ii) 282·84 m

   (iii) 244·94 m

   (iv) 400 m

(h) Correction due to refraction is given by

   (i) $0·0112 \, D^2$

   (ii) $0·0785 \, D^2$

   (iii) $0·0673 \, D^2$

   (iv) $0·0012 \, D^2$

(i) If the focal length of an object glass is 25 cm, stadia interval is 1·25 mm and the distance from object glass to the trunnion axis is 15 cm, the additive constant is

   (i) 0·1

   (ii) 1·66

   (iii) 20

   (iv) 0·4

(j) The major source of error in small-scale mapping by plane table is due to

   (i) long sight

   (ii) shrinkage of drawing sheet

   (iii) a few observations

   (iv) inaccurate centring

2. *(a)* Describe briefly how plane surveying differs from geodetic surveying.   6

  (b) A rectangular plot of land of area 0·45 hectare is represented on a map by a similar rectangle is of 5 cm². 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.   8

3. *(a)* Define the following terms :   6

Main stations, subsidiary stations, tie stations and base line

  (b) P and Q are two points 517 m apart on the same bank of a river. The bearings of a tree on the other bank observed from P and Q are N 33°40′ E and N 43°20′ W respectively. Find the width of the river if the bearings of PQ are N 78° E.   8

4. The following are the bearings observed while traversing with a compass, an area where local attraction was suspected :

Line	FB	BB
AB	59°00′	239°00′
BC	139°30′	317°00′
CD	215°15′	36°30′
DE	208°00′	29°00′
EA	318°30′	138°45′

Find the correct bearings of the lines and also the true bearings if the magnetic declination is 10° W.   14

5. *(a)* What are the advantages and disadvantages of plane tabling?   7

  (b) State and explain three-point problem in brief.   7

6. *(a)* What is the object of preparing a contour map?   4

  (b) The following consecutive readings were taken with a level and a 4-metre levelling staff on a continuously sloping ground at common intervals of 30 m :

0·855 (on A), 1·545 m, 2·335, 3·115, 3·825, 0·455, 1·380, 2·055, 2·855, 3·455, 0·585, 1·015, 1·850, 2·755. 3·845 (on B)

The RL of A was 380·500. Make enteries in a level book and apply the usual checks.

Determine the gradient of AB. 10

7. (a) What is Gale's table? What are the characteristics of this table? 5

(b) An incomplete traverse table is obtained as follows : 9

Line	Length (m)	Bearing
AB	100·0	?
BC	80·5	140°30′
CD	60·0	220°30′
DA	?	310°15′

Obtain the missing length and bearing of line as indicated in the above table.

8. (a) What is the difference between a fixed-hair tacheometer and a subtense theodolite? 5

(b) The following are the records of a tacheometric survey :

Inst. station	Staff station	Bearing	Vertical angle	Hair readings
A	B	N 30°30′ E	+ 10°0′	1·250, 1·750, 2·250
B	C	S 40°0′ E	+ 5°0′	0·950, 1·750, 2·550
C	D	S 45°0′ W	+ 8°0′	1·550, 2·150, 2·750

Multiplying constant = 100 and additive constant = 0. The staff is held vertically.

Calculate the length and bearing of DA. 9

9. Write short notes on any *four* of the following : 3½×4=14

(a) Field book

(b) Offset

(c) Local attraction

(d) Fly levelling

(e) Benchmark

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