

(iii) Error due to nonuniform graduation

(iv) Index error of vertical circle

(v) Error due to slip $6+8=14$

8. (a) Define the following :

~~(i) Counter line~~

~~(ii) Contour interval~~

~~(iii) Horizontal equivalent~~

~~(iv) What are the characteristics of contour lines?~~

~~(c) List the names of methods employed for solving three-point problem. Describe any one method in detail. $4+3+7=14$~~

9. Write short notes on any four of the following : 14

~~(a) Tape correction~~

~~(b) Optical square~~

~~(c) Diagonal scale~~

~~(d) Dumpy level~~

~~(e) Plane-table survey~~

2013

FIELD MEASUREMENT (SURVEYING)

Time : 3 hours

Full Marks : 70

Instructions :

- The marks are indicated in the right-hand margin.
- There are **NINE** questions in this paper.
- Attempt **FIVE** questions in all.
- Question No. 1 is compulsory.

1. Choose the correct option of the following (any seven) : $2 \times 7 = 14$

~~(a)~~ The main principle of surveying is to work

(i) from part to whole

~~(ii)~~ from whole to part

(iii) from higher level to lower level

(iv) from lower level to higher level

~~(b)~~ The angle of intersection of the two plane mirrors of an optical square is

(i) 30°

~~(ii)~~ 45°

(iii) 60°

(iv) 90°

- (c) The allowable length of an offset depends upon
- the degree of accuracy required
 - the method of setting out the perpendiculars and nature of ground
 - the scale of plotting
 - All of the above
- (d) The correction for sag is
- always additive
 - always subtractive
 - always zero
 - sometimes additive and sometimes subtractive
- (e) Which of the following statements is incorrect?
- The true meridians at different places are parallel to each other
 - The true meridian at any place is not variable
 - The true meridians converge to a point in northern and southern hemispheres
 - The maps prepared by national survey departments of any country are based on true meridians

- (f) The most reliable method of plotting a theodolite traverse is
- by consecutive coordinates of each station
 - by independent coordinates of each station
 - by plotting included angles and scaling off each traverse leg
 - by the tangent method of plotting
- (g) The prismatic compass and surveyor's compass
- give WCB (whole circle bearing) of a line and QB (quadrantal bearing) of a line respectively
 - both give QB of a line and WCB of a line
 - both give QB of a line
 - both give WCB of a line
- (h) Which of the following is not the function of levelling head?
- To support the main part of the instrument
 - To attach the theodolite to the tripod
 - To provide a means for levelling the theodolite
 - None of the above

(i) The line normal to the plumb line is known as

(i) horizontal line

(ii) level line

(iii) datum line

(iv) vertical line

(j) Which one of the following is Lehmann's rule of plane tabling?

(i) The location of the instrument station is always distant from each of the three rays from the known points in proportion to their distances

(ii) When looking in the direction of each of the given points, the instrument station will be on the right side of one ray and on the left side of the other ray

(iii) When the instrument station is outside the circumscribing circle, its location is always on the opposite side of the ray to the most distant point as the intersection of the other two rays

(iv) None of the above

2. (a) Differentiate between plane surveying and geodetic surveying.

(b) What do you understand by accuracy and precision?

(c) A 30 m chain was found to be 12 cm too long after chaining a distance of 1750 m. It was found to be 23 cm too long at the end of day's work after chaining a total distance of 3600 m. Find the true distance if the chain was corrected before the commencement of the work.

$$4+4+6=14$$

3. (a) What is offset? What are the points to be considered while selecting offsets?

(b) With the neat sketches, explain any two methods of chaining along a sloping ground.

(c) In chaining a line, what is the maximum slope (i) in degrees, and (ii) as 1 in n, which can be ignored if the error from this source does not exceed 1 in 1000?

$$5+4+5=14$$

4. (a) Explain the following cases with neat sketches :

(i) Obstacles to ranging but not to chaining

(ii) Obstacles to both chaining and ranging

- (b) *AB* is a chain line crossing a lake. *A* and *B* are on the opposite sides of a lake. A line *AC*, 800 m long, is ranged to the right of *AB* clear of the lake. Similarly, another line *AD*, 1000 m long, is ranged to the left of *AB* such that the points *C*, *B* and *D* are in the same line. The lengths *BC* and *BD* are 400 m and 600 m respectively. If the chainage at *A* is 1200 m, calculate the chainage of *B*.

$$7+7=14$$

5. (a) What do you understand by local attraction? What are the methods for detecting and eliminating local attraction?

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

Line	FB	BB
<i>AB</i>	71°05'	250°20'
<i>BC</i>	110°20'	292°35'
<i>CD</i>	161°35'	341°45'
<i>DE</i>	220°50'	40°05'
<i>EA</i>	300°50'	121°10'

Determine the correct magnetic bearings of the lines.

$$7+7=14$$

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

- (b) From a running fly levels from a bench mark of RL 183.215, the following readings were obtained :

BS	1.215	2.035	1.980	2.625
FS	0.965	3.830	0.980	

From the last position of the instrument, five pegs at 20 m intervals are to be set out on a uniform rising gradient of 1 in 40; the first peg is to have an RL of 181.580. Work out the staff readings required for setting the tops of the pegs on the given gradient.

$$7+7=14$$

7. (a) What are temporary adjustments of the instrument? Explain in brief. Why is it necessary?

- (b) Explain how you would take field observations with a theodolite so as to eliminate the following :

- Error due to eccentricity of verniers
- Error due to nonadjustment of line of sight