Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CE)/SEM-3/CE-303/2009-10

2009
SURVEYING – I

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) The scale along with the R.F = 1 / 2,50,000 is

a) 1 cm to 2·50 metre b) 1 cm to 250 m

c) 4 cm to 10 km d) full size.

ii) The points are generally established in chain survey by

a) square shape b) rectangle type

c) circle shape d) triangulation.

iii) The principle of surveying is to work from

a) the whole to the part

b) the part to the whole

c) the centre to the boundary

d) all of these.

iv) A right angled triangle with chain or tape is found in the proportion of

a) 10, 15 and 20 b) 3, 4 and 5

c) 6, 8 and 10 d) none of these.

v) The difficulty that can be chained across but cannot be seen across, may be got over by

a) reciprocal ranging b) direct ranging

c) ranging by eye d) none of these.

vi) Fore bearing and back bearing differ exactly by

a) 90° b) 180°

c) 270° d) 360°.

vii) A true bearing of a line is known as

a) Azimuth b) Magnetic bearing

c) Arbitrary bearing d) Reduced bearing.

viii) The plane table is so centred that the plotted point '*a*' on the paper is exactly over the ground point '*A*' through

a) a plumb bob only b) an alidade

c) a trough compass d) a plumbing U-fork.

ix) Measurement of an area of a plan or map may be done by

a) planimeter b) clinometer

c) box sextant d) optical square.

x) In a topographic map the elevations of different points are shown by means of

a) plane tabling b) contours

c) compass d) none of these.

xi) The error caused by inclined line of sight in levelling is known as

a) systematic error b) accidental error

c) collimation error d) none of these.

xii) While crossing a river, it is not possible to put the level midway but levelling can be found out by

a) Invert levelling b) Reciprocal levelling

c) Three-wire levelling d) Profile levelling.

xiii) A survey line intersects a tall building. To continue the same line, it is required with the line to set out at

a) right angle b) equilateral triangle

c) a parallelogram d) a pair of straight lines.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. A chain line *PQ* intersects a pond. Two points *A* & *B* are taken on the chain line on opposite sides of the pond. A line *AC*, 315 m long is set out on the left of *AB* & another line *AD*, 270 m long is set out on the right of *AB*. Points *C*, *B*, *D* are in the same straight line. *CB* and *BD* are 156 m and 174 m long respectively. Calculate the length of *AB*.

3. What is the meant by traverse surveying ? How does it differ from chain surveying ? 5

4. A traverse is made in the form of a square taking in clockwise order. If the bearing of *AB* is 120° 30′, find the bearing of the other sides.

5. What are the different corrections applied to levelling ?

6. Define the following terms in connection to levelling : datum surface, line of collimation, reduced level bench mark and change point.

7. Differentiate between radiation and intersection.

8. What is orientation ? What are the methods of orientation ?

9. State the Trapezoidal and Simpson's rules. What is the limitation of Simpson's rule ?

10. What is a contour line ? Define the terms "contour interval" and "horizontal equivalent".

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

11. State the Two-Point problem. How is it solved ? 2 + 13

12. a) A dumpy Level was set up midway between two pegs 80 m apart. The readings were 3·200 m and 3·015 m respectively. The instrument when shifted 20 m ahead of second peg in line with the two pegs, the respective staff readings were 2·825 m and 2·690 m. Calculate the staff readings on the two pegs to provide a horizontal line of sight. 8

    b) In the determination of sensitiveness of the bubble tube the staff is held at a distance of 100 m, the difference of staff reading for the travel of the bubble through 8 divisions (each division is 2 mm) is 0·12 m. Calculate the sensitiveness of the bubble. Calculate also the radius of curvature of the bent bubble tube. 7

13. Write short notes on any *five* of the following : 5 × 3

a) Base line, Tie line, Check line

b) True meridian, magnetic meridian, Assumed meridian

c) Orientation of plane table surveying

d) Type of offsets

e) Error in chain surveying

f) Error in plane table surveying

g) Contour characteristics

h) Difference between prismatic compass and surveyor's compass

14. a) The following offsets were taken from a chain line to a boundary :

Dist. in metre	0	20	40	60	80	120	160	200	240	270	300
Offsets in metre	24	20	16	12	8	10	14	16	20	22	26

Calculate the area enclosed by the chain line and the boundary by

i) Simpson's rule

ii) Trapezoidal rule. 10

b) What are all the methods of contouring ? Describe in brief. 5

15. a) A chain line *AD* passing an obstacle in the form of a pond. Stations *A* and *D* on the main line were taken on the opposite sides on the pond. On the left of *AD* a line *AB*, 200 m long was laid down. A second line *AC*, 250 m long was laid down on the right of *AD*, such that *B*, *D*, *C* being on the same straight line. *BD* and *DC* are 125 m and 150 m respectively. Find the length of *AD*. 10

b) What are all the instruments used for the setting out right angles ? Describe in short. 5

16. a) The following readings refer to a reciprocal levelling operation between two points *A* and *B*. If the R. L. of *A* = 378·65 m, find the R.L. of *B*. If the distance between the stations is 950 m, find the collimation error, if any, of the instrument.

Instrument at	Staff reading at	
	A	*B*
A	0·656	2·097
B	0·867	2·298

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b) A page from an old levelling book is revealed in the following table. Some readings are not clearly perceptible. Compute the lost readings from the available data. 5

Staff station	BS	IS	FS	Height of Collimation	Reduced Levels	Remarks
A				101·605	100	BM
B		1·285				
C	1·305				100·62	
D					99·060	
E	2·315				99·94	
F			1·045			
G						

c) Stations *P* and *Q* are 1600 m apart. A level was set up between *P* and *Q* such that the distance from *P* is 80 m. The readings taken on *P* and *Q* were 0·785 and 2·735 m respectively. Find true difference in elevation between *P* and *Q*. 4

17. a) The following bearings were taken in running a traverse *ABCDE* with a compass in a place where local attraction was suspected.

Line	Fore bearing	Back bearing
AB	$191^\circ 45'$	$13^\circ 0'$
BC	$39^\circ 30'$	$222^\circ 30'$
CD	$22^\circ 15'$	$200^\circ 30'$
DE	$242^\circ 45'$	$62^\circ 45'$
EA	$330^\circ 45'$	$147^\circ 45'$

Find the correct bearings of the lines. 8

b) What is magnetic declination ? A line was drawn to a magnetic bearing $234^\circ 40'$ on an old map when the magnetic declination was $4^\circ 16'$ E. To what bearing it be set now, if the present magnetic declination is $2^\circ 20'$ W ? 3 + 4

18. a) A steel tape was exactly 30 m long at 20° C when supported 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, its weight per unit length is 22 gm/m, Young's modulus is 2×10^6 kg/cm^2, $\alpha = 11 \times 10^{-6}$ per ° C. Find the correct distance when *P* is equal to

i) 5 kg

ii) 11 kg. 10

b) A 20 m chain was tested before the commencement of the day's work and found to be correct. After chaining 840 m the chain was found to be 0·08 m too long. At the end of day's work after chaining a total distance of 1376 m the chain was found to be 0·12 m too long. What was the true distance chained ? 5