Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (CE)(N)/SEM-3/CE-302/2012-13

2012

SURVEYING

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 metre

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

ii) 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.

iii) A right angle 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.

iv) The difficulty, can be chained across but can not be seen across, may be got over by

a) reciprocal ranging b) direct ranging

c) ranging by eye d) none of these.

v) Fore bearing and back bearing differ exactly by

a) 90° b) 180°

c) 270° d) 360°.

vi) A true bearing of a line is known as

a) Azimuth b) Magnetic bearing

c) Arbitrary bearing d) Reduced bearing.

vii) The plane table is so centered that the plotted point a on the paper is exactly over the ground point *A* through

a) a plumb bob only b) a trough compass

c) an alidade d) a plumbing *U*-fork.

viii) Inaccessible points may be located by the

a) resection method b) intersection method

c) radiation method d) none of these.

ix) The line passing through 'zero' declination is known as the

a) Isogonic line b) Agonic line

c) Contour line d) none of these.

x) The imaginary line of joining points of equal elevation is known as

a) horizontal line b) contour line

c) level line d) none of these.

xi) The sum of interior angles of a closed traverse is

a) $(2n-4)\times 90°$ b) $(2n+4)\times 90°$

c) $(n-4)\times 90°$ d) none of these.

xii) For improved accuracy the included angle is measured by

a) Reiteration method b) Repetition method

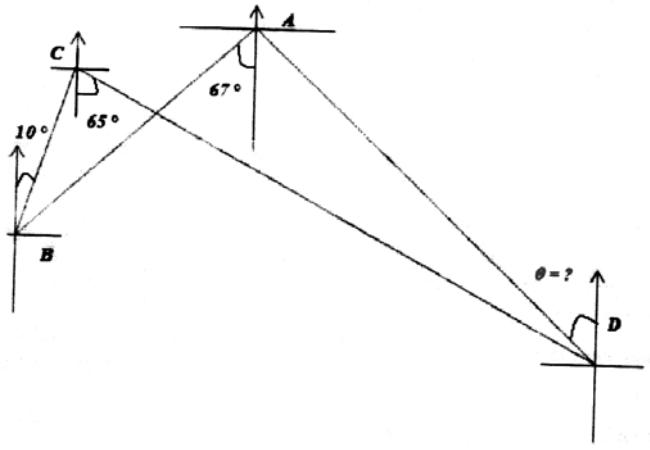
c) Deflection method d) all of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. While making survey through the woods, a surveyor with a hand compass started from point *A* and walked a thousand (1000) steps in the direction S 67° W and reached a point *B*. Then the surveyor changed his direction and walked 512 steps in the direction N 10° E and reached a point C then again he changed his direction and walked 1504 steps in the direction S 65° E and reached a point *D* as shown in Figure. Now the surveyor wants to return to the starting point *A*. In which direction should the surveyor move and how many steps should he take ?



3. a) In a plan, a 10 cm scale drawn shrinks to 9·7 cm. If the scale of the given plan is written as 1 : 250, determine the actual length of a line which at present shows 10 cm.
   b) What are the principles of surveying ?
   c) What is the fundamental difference between plan and map ? 2 + 2 + 1

4. a) While measuring the distance on a slope, it was found that the ground rises by 3·2 m for each 20 m chain length. Find the angle of slope and the hypotensual allowance per chain length.
   b) What is the length of the Gunter's chain and Revenue chain ? 4 + 1

5. Describe briefly different adjustments in case of Temporary Adjustment.

6. Describe different types of corrections for chain and tape.

7. What do you understand by Contour Interval ? Write down different characteristics of Contours.

GROUP – C
(Long Answer Type Questions)

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

8. a) Two tangents intersect at chainage 1190 m the deflection angle being 36°. Calculate all the data necessary for setting out a curve with a radius of 300 m by deflection angle, the peg interval being 30 m.
   b) Determine the offset at a distance (say x) from long chord of a simple curve. R being the radius of the curve. 10 + 5

9. Briefly explain the methods of Radiation and Intersection in Plane table survey.

Line	F.B.	B.B.
AB	80°10′	259°0′
BC	120°20′	301°50′
CD	170°50′	350°50′
DE	230°10′	49°30′
EA	310°10′	130°15′

Compute the interior angles and correct them for observational errors. Assuming the observed bearing of line *CD* to be correct adjust the bearing of the remaining sides.

10. a) The elevation of a point *P* is to be determined by observations from two adjacent stations of a tacheometric survey. The staff was held vertically upon the point, and the instrument is fitted within an anallactic lens, the constant of the instrument being 100. Compute the elevation of the point *P* from the following data, taking both the observations as equally trustworthy :

Inst. station	Height of axis	Staff point	Vertical angle	Staff readings	Elevation of station
A	1·42	*P*	+ 2°24′	1·230, 2·055, 2·880	77·750 m
B	1·40	*P*	– 3°36′	0·785, 1·800, 2·815	97·135 m

Also, calculate the distance of *A* and *B* from *P*.

b) Write about some features of tacheometry.

c) Establish the relationship $D = ks + C$; symbols have their usual meaning in tacheometry. 6 + 4 + 5

11. a) Following is the extract of a page of a level book in which the entries marked *'X'* are illegible. Complete the level book (Use Rise and Fall Method). Check your results.

Station	B.S.	I.S.	F.S.	Rise	Fall	R.L.	Remarks
1	2·285					232·460	BM-1
2	1·650		X	0·020			
3		2·105			X		
4	X		1·960	X			
5	2·050		1·925		0·300		
6		X		X		232·255	BM-2
7	1·690		X	0·340			
8	2·865		2·100		X		
9			X	X		233·425	BM-3

b) A chain line *PQ* is crossing a river at right angle. *A* and *B* are two points on opposite banks. *E* is a chain point such that *AE* = 12 m. From both *A* and *E* two perpendiculars *AC* and *ED* are set out so that *DCB* is in same line and *AC* and *ED* are 12 m and 16 m respectively. Calculate the width of the river. 12 + 3

12. a) Two straight lines *BA* and *AC* are intersected symmetrically by a third line *EF*. Angles *AEF* and *AFE* are 27·12' and 32·24' and length EF is 180 m. Find the radius of the simple curve which will be tangenital to the lines *BA, EF* and *AC* and chainage of beginning and end of curve if the chainage of *A* is 1700 m.

b) A line shown on an old map had whole circle bearing 234°40′ when magnetic declination was 4°16′ E. What will be its present bearing if its present declination is 2°20′W ? 10 + 5

13. a) A transition curve has to be provided at beginning and end of a circular curve of radius 200 m, in a road of width 3·5 m and maximum super elevation to be restricted to 15 cm. The transition curve is to be designed for such a velocity that no lateral pressure is imposed on the tyres and the rate of gain of radial acceleration is 30 cm/sec^3. Calculate the required length of the transition curve and the design speed. 6

b) Write short notes on any *three* of the following : 3 × 3

i) Principle of Survey

ii) Intersection method of Plane Table Survey

iii) Correction of curvature and refraction

iv) Characteristics of contour

v) Geodetic survey

vi) Reconnaissance Survey

vii) Isogonic and Agonic lines.

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