[3362]-108

S.E. (Civil) EXAMINATION, 2008

SURVEYING–I

(2003 COURSE)

Time : Three Hours　　　　　　　　**Maximum Marks : 100**

N.B. :— (*i*) Answers to the two Sections should be written in separate answer-books.

　　　(*ii*) Neat diagrams must be drawn wherever necessary.

　　　(*iii*) Figures to the right indicate full marks.

　　　(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

　　　(*v*) Assume suitable data, if necessary.

　　　(*vi*) *All* questions are compulsory.

SECTION I

1. (*a*) With the help of neat sketch, derive the expression for combined correction for curvature and refraction. [6]

　　(*b*) Draw a neat sketch of auto level and explain the function of tilt compensator. [5]

(c) Two bench marks A and B are 1200 m apart across a wide river. The following reciprocal levels are taken with one level. [6]

Level at	Reading on	
	A	B
A	1.485	2.364
B	1.037	1.402

The error in collimation adjustment of the level is + 0.004 m in 30 m. Calculate the true difference of level between A and B and error due to refraction.

Or

2. (a) An observer standing on the bridge of a ship just sees the mast of another ship. If the height of observer's eye above sea level is 38 m, and that of the mast of other ship is 48 m, what is the distance between the two ships ?   [6]

(b) List the fundamental axes of transit Vernier theodolite. Give the conditions of adjustments between these axes, when theodolite is in perfect adjustment.   [5]

(c) Explain the procedure of permanent adjustment of theodolite to make the axis of plate bubble perpendicular to vertical axis.   [6]

3. (a) The following are the particulars of part of a traverse survey : [6]

Line	Length m	Bearing
AB	160.0	18° 12'
BC	363.3	132° 42'
CD	488.3	210° 24'

Find the distance between a point P on AB, 91.7 m from A and point R on CD, 226.7 m from C.

(b) Explain the method of repetition for measurement of horizontal angles by theodolite. [5]

(c) Explain various methods of locating details in theodolite traver survey with the help of neat sketches. [6]

Or

4. (a) The following table gives the latitudes and departures of the sides of a closed traverse ABCD. [6]

Side	Latitude	Departure
	m	m
AB	+ 214.8	+ 124.0
BC	−245.1	+ 205.7
CD	−155.9	−90.0
DA	+186.2	−239.7

Find out the total coordinates and area of the traverse by assuming the total coordinates of A as (200, 100).

(*b*) Explain the method of prolonging a straight line by double sighting with the help of neat sketch. [6]

(*c*) What is meant by open traverse ? Where is it used ? Explain how open traverse is checked. [5]

5. (*a*) A tacheometer fitted with anallatic lens was used to observe the following : [6]

From	To	Bearing	Vert. Angle	Hair Readings
C	A	320°	+ 12°	0.906, 1.721, 2.550
C	B	50°	+ 10°	0.744, 2.199, 3.654

The value of the multiplying constant was 100 and the staff was held vertically. Determine the length and gradient of AB.

(*b*) Explain the method of tacheometric coutouring by radial line method. [5]

(*c*) Explain how the constants of tacheometer are determined by field method. [5]

Or

6. (*a*) Derive the expression for horizontal distance between instrument station and vertical staff station in tacheometry when the line of sight is inclined. [6]

(b) The following observations are made on a vertically held staff with a tacheometer fitted with an anallatic lens. The constants of the instrument are 100 and zero.

Inst. St.	H.I.	Staff St.	W.C.B.	Vert. Angle	Staff Reading
P	1.65	A	250°	+3° 30'	1.15, 1.65, 2.15
		B	175°	−2° 0'	0.75, 1.65, 2.55

The RL of instrument station P = 250 m. Calculate the length of line AB, elevation of stations A and B and gradient of line AB. [6]

(c) State various uses of contour map. [4]

SECTION II

7. (a) Describe how to set a circular curve by perpendicular offsets from the long chord with the help of neat sketch. [5]

(b) What are the different types of curves ? Draw neat sketch of each. [5]

(c) Calculate the ordinates at 10 m interval for setting out a circular curve of 200 m radius for a deflection angle of 60°. Use method of offsets from the long chord. [7]

Or

8. (a) State various obstacles in setting out curves. Explain the procedure of setting out simple circular curve when point of intersection is inaccessible. [5]

(b) Two tangents PQ and QR intersect at chainage 2100 m. The angle of deflection is 40°. Calculate all data necessary for setting out a circular curve of radius 250 m by deflection angle method. The peg interval taken is 20 m. Calculate data for field checking. [8]

(c) Draw a neat sketch of circular curve and show various elements on it. [4]

9. (a) Two straight lines AB and BC are intersected by a line MN. The angles AMN and MNC are 145° and 140° respectively. The radius of the first curve is 300 m and that of second curve is 500 m. Find the chainages of tangent points and the point of compound curvature, given that the chainage of the point of intersection is 2500 m. [8]

(b) What is meant by transition curve ? What are the objectives of providing transition curve ? [4]

(c) Explain the procedure of setting out compound curve with the help of sketch. [5]

Or

10. (a) Derive the equations for various elements of compound curve. [8]

(b) Draw an illustrative sketch of a reverse curve to show its various elements. [4]

(c) Calculate the length of transition curve, when rate of radial acceleration is 0.3 m/s³, allowable speed on curve is 40 km/hr and the radius of circular curve is 300 m. [5]

11. (a) State various methods of plane table survey. Explain method of radiation with the help of sketch. [5]

(b) What is a two point problem ? Explain with a neat sketch the procedure of solving a two point problem in plane table survey. [5]

(c) Write a short note on tunnel survey. [6]

Or

12. (a) Discuss the advantages and disadvantages of plane table survey over the theodolite traverse survey. [6]

(b) What is meant by orientation in plane table survey ? Explain orientation by backsighting. [5]

(c) Write a short note on survey for sewers. [5]