

**II B.Tech I Semester Regular Examinations, November 2005****SURVEYING-I  
(Civil Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions  
All Questions carry equal marks**

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1. Write short notes on the following [4×4=16]
  - (a) Hypotenusal allowance
  - (b) Cumulative & Compensating errors
  - (c) Triangulation.
  - (d) Cross - Staff survey.
2. (a) The magnetic bearing of a line was found to be  $N 60^{\circ}30'W$  in 1956 when the declination on was  $5^{\circ}10'E$ . Find its present magnetic bearing if declination is  $3^{\circ}W$  at present. [6]
  - (b) What is local attraction? How is it detected and how the observed bearings are corrected for the same?. [10]
3. (a) Describe plane table intersection method along with neat sketches. [8]
  - (b) State and explain the two - point problem and how it is solved. [8]
4. (a) Draw a sketch of a dumpy level and name the parts. [6]
  - (b) Complete the level table given below. [10]

Station	Distance	BS	IS	FS	Rise	Fall	RL
BM		3.000					190.620
1	0		2.460				
2	20		0.970				
3	40	1.820		3.860			
4	60	1.100		0.570			
5	80		4.410				
6	100	0.120		1.770			
7	120		2.930				
8	140			1.310			

Find the gradient of the line joining first and last points

5. (a) Define contour, contour interval, horizontal equivalent. [6]
  - (b) Suggest some suitable values of contour interval for different scales of map and type of ground. [5]
  - (c) Explain the uses of contours. [5]

6. (a) What is Trapezoidal Rule in the computation of areas of figures. Derive an expression for it. [8]
- (b) Calculate the area between the chain line and an irregular boundary and the first and last offsets by [8]
- Trapezoidal rule
  - Simpsons Rule, if the observed data is as follows

Distance (m)	0	8	16	24	32	40	48
Offset (m)	3.2	4.6	4.4	5.9	4.2	3.6	2.8

7. (a) Compute the volume of cutting in cubic metres for a road from the following data. Breadth of formation = 10m. Side slope = 1  $\frac{1}{2}$  to 1. [8]

Distance (m)	Depth of cutting (m)	Cross slope of the surface of the ground
0	1.9	1 in 12
40	2.1	1 in 8
80	2.3	1 in 10

- (b) The area within the contour line at the site of reservoir and face of the proposed dam are as follows. [8]

Contour	Area( $m^2$ )
101	1000
102	12800
103	95200
104	147600
105	872500
106	1350000
107	1985000
108	2286000
109	2512000

Taking 101 as the bottom level of the reservoir and 109 as top level, Calculate the capacity of the reservoir.

8. (a) What is meant by zero circle? Describe various methods of determining its area. [8]
- (b) What is a Box Sextant. How it is used for the measurement of Horizontal angle. [8]

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1. (a) Write short notes on [4+4]
  - i. Reconnaissance
  - ii. Normal Tension.
- (b) Calculate the sag correction for a 30m steel under a pull of 100 N in three equal spans of 10m each. Weight of one cubic cm of steel = 0.078 N. Area of cross section of tape = 0.08 Sq.cm [8]
2. (a) Differentiate between Isogonics lines and Agonic lines. [6]
- (b) The following bearings were observed in a closed traverse. Calculate the included angles and verify whether the usual geometric condition is satisfied or not [10]

Line	F.B	B.B
AB	S 45° E	N 45° W
BC	N 60° E	S 6° W
CD	N 5° E	S 5° W
DE	N 65° W	S 65° E
EA	S 50° W	N 50° E

3. (a) Explain the procedure of plane table surveying step by step. [8]
- (b) List out different methods of plane tabling. Explain plane Table Radiation method along with neat sketches. [8]
4. Derive a simple expression for the combined correction  $h$  ( in meters) due to the earth's curvature and atmospheric refraction in terms of the distance  $D$  ( in km) between two levelling stations. The radius of earth is 6,400 km and the correction for refraction is  $(1/7)$  that for curvature. Also discuss the effect of curvature and refraction. [16]
5. (a) Define contour, contour interval, horizontal equivalent. [6]
- (b) Suggest some suitable values of contour interval for different scales of map and type of ground. [5]
- (c) Explain the uses of contours. [5]
6. (a) List out different general methods of determining areas. Explain how the areas are computed by sub-division into triangles. What are the limitations of the method? [8]

- (b) The following are the values in metres of the off sets taken from a chain to an irregular boundary. [8]

Distance: 0    20    40    60    80    100    120    140    160

Offset:    3.5    5.1    6.7    6.2    5.4    6.9    7.4    6.4    5.8

Calculate the area in square metres included between the chain line, the irregular boundary and the last offset by simpson's rule

7. (a) Explain the detailed procedure of finding out the capacity of a reservoir. [8]  
 (b) Levels were taken at every 40 m along a piece of ground. The following observations were recorded. [8]

Distance (m) :	0	40	80	120	160	200
R.L.(m) :	105.0	114.2	123.6	128.0	130.2	125.6

A cutting is to be made for a line of uniform gradient through the first and the last point. Determine its gradient calculate the volume of excavation if the formation width is 8.0 m with side slopes in cutting being 1.5:1 and the natural ground slope being 10:1. The ground across the centre line is level.

8. (a) Describe planimeter. Explain how you would use it in finding the area of a given figure. What precautions would you take in its manipulation. [8]  
 (b) Explain how Ceylon Ghat tracer is used to measure the slope between two given points of the ground. [8]

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1. (a) Describe the survey field book and show how the field measurements are entered in it ? How is a chain survey plotted? [8]  
(b) Find the maximum length or offset so that the displacement on paper should not exceed 0.035 cm. given that the offset was laid out  $5^\circ$  from its true direction and the scale is 1cm = 1m. [8]
2. (a) The true bearing of a tower observed from a station A is  $350^\circ 30'$  and the magnetic bearing of the tower is  $2^\circ 30'$ . The back bearing of the line AB when measured with a prismatic compass was found to be  $330^\circ 30'$ . What is the true bearing of the line AB? [8]  
(b) Explain the Bow ditch rule for adjusting a compass traverse, with neat sketches. [8]
3. (a) What do you understand by the term plane table survey? When is it recommended? [8]  
(b) Describe the various instruments used in plane Table survey. What are their functions? [8]
4. (a) Explain why it is necessary to keep the level midway between backsight and foresight readings. [4]  
(b) The following consecutive readings were taken with a Dumpy level. 6.21, 4.92, 6.12, 8.42, 9.1, 6.63, 7.91, 8.26, 9.71, 10.21. [12]  
The level was shifted after 4<sup>th</sup>, 6<sup>th</sup> and 9<sup>th</sup> readings. The R.L of first point was 125.00. Rule out of page of level field work and fill all the columns. Calculate the reduced levels and apply usual checks.
5. (a) What is indirect method of locating contours? Explain step by step procedure of locating contours by method of squares. [8]  
(b) What do you mean by interpolation of contours? Explain arithmetical method of interpolation of contours. [8]
6. (a) What is Simpsons Rule in the computation of areas figures. Derive and expression for it. [8]  
(b) The following offsets were taken from a chain line to a hedge. Calculate the area enclosed between the chain line and hedge by [8]
  - i. Simpsons Rule
  - ii. Trapezoidal rule

7. (a) Compute the volume of cutting in cubic metres for a road from the following data. Breadth of formation = 10m. Side slope =  $1\frac{1}{2}$  to 1. [8]

Distance (m)	Depth of cutting (m)	Cross slope of the surface of the ground
0	1.9	1 in 12
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- (b) The area within the contour line at the site of reservoir and face of the proposed dam are as follows. [8]

Contour	Area( $m^2$ )
101	1000
102	12800
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107	1985000
108	2286000
109	2512000

Taking 101 as the bottom level of the reservoir and 109 as top level, Calculate the capacity of the reservoir.

8. (a) How will you use a line ranger in the field. Explain with a neat sketch. [8]
- (b) Explain the principle of sextant. Prove mathematically that the angle of deviation of the reflected ray is twice the angle between the reflecting surfaces of the sextant. [8]

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1. (a) What are the obstacles in chaining ? Explain about them. [8]  
(b) Find the maximum permissible error in laying off the direction of the off set so that the max. displacement may not exceed 0.025cm on the paper, given that the length of the off set is 15m, the scale is 50m to 1cm, and the max. error in the length of the off set is 50cm. [8]
2. (a) The true bearing of a tower observed from a station A is  $350^{\circ}30'$  and the magnetic bearing of the tower is  $2^{\circ}30'$ . The back bearing of the line AB when measured with a prismatic compass was found to be  $330^{\circ}30'$ . What is the true bearing of the line AB? [8]  
(b) Explain the Bow ditch rule for adjusting a compass traverse, with neat sketches. [8]
3. (a) Explain the procedure of plane table surveying step by step. [8]  
(b) List out different methods of plane tabling. Explain plane Table Radiation method along with neat sketches. [8]
4. (a) List out carefully and systematically, the field precautions a surveyor should take to ensure good results from leveling field work planned for engineering purposes. [8]  
(b) Two pegs A and B are fixed 100 m apart. A level is set up near A. Observations on a staff held at A and B gave the following readings A = 1.650 B = 1.665. The level is then placed near B and observations on a staff held at A and B gave the following; A = 1.590, B = 1.575. State whether the instrument is in adjustment or not. Also determine the correct difference in level between A and B. [8]
5. (a) Discuss the different factors based on which the choice of proper contour interval depends. [6]  
(b) Explain the different characteristics of contours along with neat sketches. [10]
6. (a) What is Simpsons Rule in the computation of areas figures. Derive and expression for it. [8]  
(b) The following offsets were taken from a chain line to a hedge. Calculate the area enclosed between the chain line and hedge by [8]
  - i. Simpsons Rule
  - ii. Trapezoidal rule

7. (a) At a station a trench was measured and found to be 1m wide and 1.25m deep. At the next station, 10m away from the first one, it was 1.1m wide 2.8m deep. Determine the volume of earth work between the two stations using the prismoidal formula. [8]
- (b) The area between the consecutive contours measured with the help of a planimeter were as follows. [8]

Contour	Area( $m^2$ )
425	705000
420	642700
415	508300
410	341200
405	157300
400	80600
395	11500
390	3000

Estimate the capacity of reservoir by taking 390m as the datum level. Use the prismoidal formula.

8. (a) How will you use a line ranger in the field. Explain with a neat sketch. [8]
- (b) Explain the principle of sextant. Prove mathematically that the angle of deviation of the reflected ray is twice the angle between the reflecting surfaces of the sextant. [8]

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