

II B.Tech I Semester Supplementary Examinations, November 2006
SURVEYING-I
(Civil Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the principles of surveying ? [8]
 (b) The plan of an area has shrunk such that a line originally 10 cm now measures 9.5 cm. If the original scale of the plan was 1cm = 50m; Determine [8]
 - i. the shrinkage factor
 - ii. shrunk scale
 - iii. correct distance corresponding to a measured distance of 980 m
 - iv. correct area corresponding to a measured area of 10,000 m².
2. (a) What is a traverse ? Explain the different types of traversing. [8]
 (b) Convert the following whole circle bearings to quadrantal bearings. [8]
 - i. 350°12'
 - ii. 117°24'
 - iii. 68°51'
 - iv. 212°04'
3. (a) State and explain three-point problem in plane table surveying? How does one solve it? When does the solution become impossible? [8]
 (b) Explain plane table traversing method with the aid of neat sketches. [8]
4. (a) Describe the obstacles and difficulties that one comes across in levelling work. [8]
 (b) Fill up the missing entries, marked (x). [8]

Point	BS	IS	FS	Rise	Fall	RL	Remarks
1	3.125					(x)	BM-A
2	(x)		(x)	1.325		125.005	Change point
3		2.320			0.055		
4		(x)				125.350	
5	(x)		2.655				Change point
6	1.620		3.205				Change point
7		3.625			2.165		
8			(x)			122.590	BM-B

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) Explain how the area of a land portion is determined from the plotted figure. [8]
- (b) The offsets taken at 5m intervals from a chain line to a curved boundary are 0, 4.6, 6.5, 6.8, 5.2, 3.5 and 2.2 metres. Calculate the area enclosed between the chain line, curved boundary line and the end offsets using both simpsons and Trapezoidal Rules. [8]
7. (a) In a certain railway cutting the width at formation level is 9m. The side of the cutting slope at 1 to 1 and the original ground surface has a side slope of 1 in 8. Determine the volume and cost of the cutting contained in a length of 240m, the average depth of cutting being 1.8m and its cost is Rs 50 per 100 cubic metres. [8]
- (b) Calculate the quantity of earth work in cubic metres required for a road embankment from the following data. Formation width = 9m; side slope 2 to 1. [8]

Distance (m)	Height of bank(m)	Side slope of original ground
0	3.0	1 in 10
30	3.6	1 in 8
60	2.7	1 in 12

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° from its true direction and the scale is 1cm = 1m. [8]
2. Below are the bearings observed in a traverse survey conducted with a prismatic compass at a place where local attraction was suspected. [16]

Line	F.B	B.B
PQ	124 ⁰ 30'	304 ⁰ 30'
QR	68 ⁰ 15'	246 ⁰ 00'
RS	310 ⁰ 30'	135 ⁰ 15'
SP	200 ⁰ 15'	17 ⁰ 45'

At what stations do you suspect local attraction? Find the correct bearings of the lines? Also calculate the included angles.

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) Describe the obstacles and difficulties that one comes across in levelling work. [8]
 (b) Fill up the missing entries, marked (x). [8]

Point	BS	IS	FS	Rise	Fall	RL	Remarks
1	3.125					(x)	BM-A
2	(x)		(x)	1.325		125.005	Change point
3		2.320			0.055		
4		(x)				125.350	
5	(x)		2.655				Change point
6	1.620		3.205				Change point
7		3.625			2.165		
8			(x)			122.590	BM-B

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) Explain different ways of determining areas by computations based on measurements scaled from a map. [8]
- (b) Determine the area in hectares between the line AB and a meandering stream for offsets taken at a regular interval of 20m along the line AB. Use both Trapezoidal rule and Simpson's rule. [8]

Point	A								B
Distance (m)	0	20	40	60	80	100	120	140	160
Offset lengths(m)	23	40	42	30	32	60	10	14	22

7. (a) In a certain railway cutting the width at formation level is 9m. The side of the cutting slope at 1 to 1 and the original ground surface has a side slope of 1 in 8. Determine the volume and cost of the cutting contained in a length of 240m, the average depth of cutting being 1.8m and its cost is Rs 50 per 100 cubic metres. [8]
- (b) Calculate the quantity of earth work in cubic metres required for a road embankment from the following data. Formation width = 9m; side slope 2 to 1. [8]

Distance (m)	Height of bank(m)	Side slope of original ground
0	3.0	1 in 10
30	3.6	1 in 8
60	2.7	1 in 12

8. (a) List out permanent adjustments of a Sextant. Explain how adjustment of horizon glass and elimination of index error are carried out in case of Box Sextant. [8]
- (b) Explain the principle and working of pantagraph with a neat sketch. [8]

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1. (a) What is reciprocal ranging ? Explain it in detail. [8]
 (b) A 30 m tape actually measure 29.985 m when it is supported at the two ends only, with the temperature at $30^{\circ}C$ and a tension of 70N. The tape weighs 12 N and has a cross sectional area of $0.04cm^2$. If the field temperature is also $30^{\circ}C$, what tension should be applied so that the tape measures exactly 30 m when supported at the two ends. [8]
2. (a) Derive rules to calculate reduced bearing from whole circle bearing for all the quadrants. [8]
 (b) The following bearings were observed in traversing with a compass

AB	$74^{\circ} 00'$	BA	$254^{\circ} 00'$
BC	$91^{\circ} 00'$	CB	$271^{\circ} 00'$
CD	$166^{\circ} 00'$	DC	$343^{\circ} 00'$
DE	$177^{\circ} 00'$	ED	$0^{\circ} 00'$
EA	$189^{\circ} 00'$	AE	$9^{\circ} 00'$

Where do you suspect the local attraction? Find the correct bearings of lines?
 [8]

3. (a) What is meant by orientation. Explain the two methods of orienting the plane table. [8]
 (b) List the advantages and disadvantages of plane table surveying. [8]
4. (a) Describe the obstacles and difficulties that one comes across in levelling work. [8]
 (b) Fill up the missing entries, marked (x). [8]

Point	BS	IS	FS	Rise	Fall	RL	Remarks
1	3.125					(x)	BM-A
2	(x)		(x)	1.325		125.005	Change point
3		2.320			0.055		
4		(x)				125.350	
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7		3.625			2.165		
8			(x)			122.590	BM-B

5. (a) Explain tacheometric method of locating contours with a neat sketch. Under what circumstances this method is preferred to. [8]
 (b) Explain in detail how the contour plan is used to calculate the capacity of a reservoir. [8]
6. (a) What do you mean by term “Area”, What are the different units of area in metric system. Also explain how the area of plan of a plot is computed graphically. [8]
 (b) A series of offsets were taken from a chain line to a curved boundary at an interval of 15m in the following order.
 1.25, 3.89, 4.86, 3.2, 6.8, 8.9, 6.2, 5.8, 4.2, 3.6, 2.4, 0 metres. Calculate the area between the chain line and the curved boundary line by Trapezoidal and Simpsons Rules. [8]
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]

8. (a) Explain how an Indian Tangent clinometer is used in plane table surveys for contouring. [8]
 (b) Explain how pantograph is used for enlarging, reducing or reproducing the plans. [8]

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1. (a) Differentiate clearly between plane and geodetic surveying. [8]
 (b) The distance between two points measured along a slope is 126m. Find the horizontal distance between them, if [8]
 - i. The angle of slope between the points is $60^{\circ}30'$
 - ii. The difference in level is 30m
 - iii. The slope is 1 in 4.
2. (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]
3. (a) What is meant by orientation. Explain the two methods of orienting the plane table. [8]
 (b) List the advantages and disadvantages of plane table surveying. [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.
 The level was shifted after 4th, 6th and 9th 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. [12]
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) The following perpendicular offsets were taken from a chain line to a hedge.

Chainage(m)	0	15	30	45	60	70	80	100	120	140
Offsets (m)	7.60	8.5	10.7	12.8	10.6	9.5	8.3	7.9	6.4	4.4

Calculate the area between the survey line, the hedge and the end offsets by Trapezoidal Rule and Simpson's Rule. Calculate the area between the survey line, the hedge and the end offsets by Trapezoidal Rule and Simpson's Rule. [8]

- (b) The data of a closed traverse survey is shown below. Determine the area. [8]

Line	Latitude(m)	Departure(m)
AB	-300	+450
BC	+640	+110
CD	+100	-380
DA	-440	-180

7. (a) A railway embankment is 10m wide with side slopes $1\frac{1}{2}$ to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120m, the centre heights at 20m intervals being in metres 2.2, 3.7, 3.8, 4.0, 3.8, 2.8 and 2.5. [8]
- (b) A road embank is 8m wide and 200m in length at the formation level with a side slope of 1.5:1. The embankment has a rising gradient of 1 in 100m. The ground levels at every 50m along the centre line are as follows.

Distance (m)	0	50	100	150	200
R.L.(m)	164.5	165.2	166.8	167	167.2

The formation level of zero chainage is 166m. Calculate the volume of earth work. [8]

8. (a) What is a prism square. What is the working principle behind it? Explain how it is used in the field. [8]
- (b) Explain construction and working of a box sextant. Explain how it is used for the measurement of vertical angle. [8]

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