

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**SURVEYING**
(Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) Explain the principle on which chain survey is based. (3M)
- b) Distinguish clearly between chain surveying and traverse surveying. (4M)
- c) Define contour and contour intervals. (4M)
- d) Define swinging the telescope and transiting the telescope. (4M)
- e) Write about GPS. (3M)
- f) How do you determine the capacity of a reservoir? (4M)

PART -B

2. a) Discuss in brief the different sources of errors in surveying. (8M)
- b) Describe briefly the use of various accessories of a plane table. (8M)
3. a) The following lengths and bearings were recorded in running a theodolite traverse in the counter clockwise direction, the length of CD and bearing of DE having been omitted. (10M)

Line	Length in m	R.B
AB	281.4	S 69 ⁰ 11' E
BC	129.4	N 21 ⁰ 49' E
CD	?	N 19 ⁰ 34' W
DE	144.5	?
EA	168.7	S 74 ⁰ 24' W

Determine the length of CD and the bearing of DE.

- b) What is local attraction? How is it detected and eliminated? (6M)

4. a) What are the different errors in theodolite work? How are they eliminated? (10M)
 b) Explain how a subtense bar is used with a Theodolite to determine the horizontal distance between two points. (6M)
5. Write about parts of the Transit Theodolite. Explain in detail. (16M)
6. a) What is Simpson's rule? Derive an expression for it. (8M)
 b) Calculate the volume of earth work by Prismoidal formula in a road embankment with the following data: (8M)

Chainage along the centre line	0	100	200	300	400
Ground levels	201.70	202.90	202.40	204.70	206.90

Formation level at chainage 0 is 202.30 top width is 2.00 ft side slopes are 2 to 1. The longitudinal gradient of the embankment is 1 in 100 rising. The ground is assumed to be level all across the longitudinal section.

7. a) A railway embankment 400 m long is 12 m wide at the formation level and has the side slope 2 to 1. The ground levels at every 100 m along the centre line are as under: (8M)

Distance	0	100	200	300	400
R. L.	204.8	206.2	207.5	207.2	208.3

The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork.

- b) Derive TRAPEZOIDAL FORMULA (Average end area Method). (8M)

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PART -A

1. a) Discuss in brief the principles of surveying. (3M)
- b) Define the true bearing and magnetic bearing. (4M)
- c) Define the following terms Benchmark, Parallax. (4M)
- d) What are 'face left' and 'face right' observations? Why is it necessary to take both face observations? (4M)
- e) Write about total stations. (4M)
- f) What is a Prismoid? (3M)

PART -B

2. a) What is back bearing and what are the advantages of observing it in a traverse? (8M)
- b) For the following traverse, find the length of DE so the A, E and F may be in the same straight line: (8M)

Line	Length in meters	R. B.
AB	200	S $84^{\circ} 30'$ E
BC	100	N $75^{\circ} 18'$ E
CD	80	N $18^{\circ} 45'$ E
DE	-	N $29^{\circ} 45'$ E
EF	150	N $64^{\circ} 10'$ E

3. Describe the 'height of instrument' and 'rise and fall' methods of computing the levels. Discuss the merits and demerits of each. (16M)
4. Explain how you would measure with a Theodolite (16M)
 - a) The horizontal angle by repetition.
 - b) The Vertical angle.
 - c) The Magnetic bearing of line.
5. Explain the temporary adjustments of a transit theodolite (16M)
6. The tangents to a railway meet at an angle of 148° . Owing to the position of a building, a curve is to be chosen that will pass near point 10 metres from the point of intersection of the tangents on the bisector of the angle 148° . Calculate the suitable radius of the curve. (16M)
7. Derive an expression for trapezoidal formula for volume. Compare it with the prismoidal formula. (16M)

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PART -A

1. a) Differentiate clearly between plane and geodetic surveying. (3M)
- b) What is local attraction? How is it detected and eliminated? (4M)
- c) Define the following terms: Line of collimation, Level surface. (4M)
- d) What are the different errors in theodolite work? (4M)
- e) Mention different types of curves with figures. (3M)
- f) How do you determine the earth work for a borrow pit? (4M)

PART -B

2. a) Give, in a tabular form, the difference between prismatic compass and surveyor's compass. (6M)
- b) From a point C, it is required to set out a line CD parallel to a given line AB, such that ABD is a right angle. C and D are not visible from A and B, and traversing is performed as follows: (10M)

Line	Length in m	Bearing
BA	-	360 ⁰ 0'
BE	51.7	290 ⁰ 57'
EF	61.4	352 ⁰ 6'
FC	39.3	263 ⁰ 57'

Compute the required length and bearing of CD.

3. What are the different types of leveling staff? State the merits and demerits of each. (16M)
4. a) Describe the conditions under which tacheometric surveying is advantageous. Explain how you would obtain in the field the constants of a techeometer. (10M)
- b) Two distances of 50 and 80 metres were accurately measured out, and the intercepts on the staff between the outer stadia webs were 0.496 at the former distance and 0.796 at the latter. Calculate the techeometric constants. (6M)

5. What are the different errors in survey measurements? Describe the method most commonly used in chain surveying. (16M)
6. What are the common difficulties in setting out simple curves? Describe briefly the methods employed in overcoming them. (16M)
7. Calculate the volume of earth work by Prismoidal formula in a road embankment with the following data: (16M)
- | | | | | | | |
|--------------------------------|---|--------|--------|--------|--------|--------|
| Chainage along the centre line | 0 | 100 | 200 | 300 | 400 | |
| Ground levels | | 201.70 | 202.90 | 202.40 | 204.70 | 206.90 |
- Formation level at chainage 0 is 202.30, top width is 2.00 ft side slopes are 2 to 1. The longitudinal gradient of the embankment is 1 in 100 rising. The ground is assumed to be level all across the longitudinal section.

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2. Answer **ALL** the question in **Part-A**

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PART -A

1. a) Distinguish clearly between cumulative and compensating errors. (3M)
- b) Distinguish clearly between closed traverse and open traverse. (4M)
- c) Define the following terms vertical line, bubble line. (4M)
- d) State what errors are eliminated by repetition method. (3M)
- e) Write about geodetic survey. (4M)
- f) Explain about Embankment with sketch (4M)

PART -B

2. a) Determine the values of included angles in the closed compass traverse ABCD (8M)
conducted in the clockwise direction, given the following fore bearings of their
respective lines:

Line	F.B.
AB	40 ⁰
BC	70 ⁰
CD	210 ⁰
DA	280 ⁰

- Apply the check.
- b) What is error of closure? How is it balanced graphically? (8M)
 3. Describe with the help of sketches the characteristics of contours. (16M)
 4. a) What are the different accessories of plane table survey? (8M)
 - b) Differentiate between prismatic compass and surveyors compass. (8M)
 5. Explain how you would determine the constants of a tachometer. What are the advantages of an analytical lens used in a tachometer? (16M)
 6. The chainage at the point of intersection of the tangents to a railway curve is 3876 links, and the angle between them is 124⁰. Find the chainage at the beginning and end of the curve if it is 40 chains radius, and calculate the angles which are required in order to set out this curve with a chain tape only. (16M)
 7. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 metres in the following order. 0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m. Compute the area between the chain line, the curved boundary and the end offsets by a) average ordinate rule, (16M)
b) trapezoidal rule, and
c) Simpson's rule.

II B. Tech I Semester Supplementary Examinations, May/June - 2016
SURVEYING
 (Civil Engineering)

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 2. Answer **ALL** the question in **Part-A**
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PART -A

1. a) What are the survey stations?
 b) What is the purpose of traversing?
 c) Define reciprocal leveling
 d) How will you find the constants of a tacheometer?
 e) What is meant by Degree of curve?
 f) Write the method of a computation of volume of earthwork

PART -B

2. a) Differentiate clearly between plane and geodetic surveying.
 b) Distinguish clearly between cumulative and compensative errors.
3. A nominal distance of 30m was set out with a 30m steel tape from a mark on the top of one peg to a mark on the top of another, the tape being in catenary under a pull of 10kg and at a mean temperature of 70°F. The top of one peg was 0.25m below the top of other. The top of higher peg was 460m above mean sea level. Calculate the exact horizontal distance between the marks on the two pegs and reduce it to mean sea level, if the tape was standardized at a temperature of 60°F, in catenary, under a pull of (a) 8 Kg , (b) 12 Kg, (c) 10 Kg.
 Take radius of earth = 6370 Km
 Density of tape = 7.86 g/cm³.
4. a) Differentiate between permanent and temporary adjustments of level.
 b) Discuss the effects of curvature and refraction in levelling. Find the correction due to each and the combined correction.
5. Explain how would you measure with theodolite:
 - a) Horizontal angle by repetition
 - b) Vertical angle
 - c) Magnetic bearing of line.
6. Calculate the reduced levels of the various station pegs on a vertical curve connecting two uniform grades of +0.5% and -0.7%. The Chainage and the reduced level of the point of intersection are 500m and 330.750m respectively. Take the rate of change of grade as 0.1% per 30m.
7. Derive an expression for trapezoidal formula for volume. Compare it with the prismoidal formula.

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II B. Tech I Semester Regular/Supplementary Examinations, Dec - 2015
SURVEYING
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

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PART-A

1. a) Explain the different methods of chaining on sloping ground. What is hypotenusal allowance?
- b) Explain with the help of neat sketch, the graduations of a prismatic compass and a surveyor's compass.
- c) Distinguish between the Horizontal plane and level surface.
- d) Explain how you would take field observations with a theodolite so as to eliminate the Error due to eccentricity of verniers.
- e) Explain length of the simple curve.
- f) What is average ordinate rule? Derive expression for it. (4M+4M+3M+4M+3M+4M)

PART-B

2. a) Derive rules to calculate reduced bearing from whole circle bearing for all the quadrants.
- b) The following bearing were observed with a compass:

AB	74° 0'	BA	254° 0'
BC	91° 0'	CB	271° 0'
CD	166° 0'	DC	343° 0'
DE	177° 0'	ED	0° 0'
EA	189° 0'	AE	9° 0'

Where do you suspect the local attraction? Find the correct bearings. (6M+10M)

3. a) Explain the Principle of surveying (traversing) with the compass.
- b) Distinguish clearly between closed traverse and open traverse. (8M+8M)

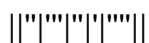


4. a) Differentiate between 'Permanent' and temporary' adjustments of level.
 b) Discuss the effects of curvature and refraction in leveling. Find the correction due to each and the combined correction. Why are these effects ignored in ordinary leveling?
 (6M+10M)
5. The vertical angles to vanes fixed at 0.5m and 3.5m above the foot of the staff held vertically at a point were $- 0^{\circ} 30'$ and $+ 1^{\circ} 12'$ respectively. Find the horizontal distance and the reduced level of the point, if the level of the instrument axis is 125.380meters above datum. (16M)
6. A transition curve is required for a circular curve of 400m radius, the gauge being 1.5m between rail centre and maximum super-elevation restricted to 12cm. The transition to be designed for a velocity such that no lateral pressure is imposed on the rails and the rate of gain of the radial acceleration is 30cm/sec^3 . Calculate the required length of transition curve and the design speed. (16M)
7. A rectangular plot ABCD forms the plane of a pit excavated for road work. E is point intersection of the diagonals. Calculate the volume of the excavation in cubic meters from the following data:

Point	A	B	C	D	E
Original level	45.2	49.8	51.2	47.2	52.0
Final level	38.6	39.8	42.6	40.8	42.5

Length of AB = 50 m and BC = 80 m.

(16M)



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PART-A

1. a) Explain the principle on which chain survey is based.
- b) What are the sources of errors in compass survey and what precautions will you take to eliminate them?
- c) Distinguish between the Line of collimation and line of sight.
- d) Explain how you would take field observations with a theodolite so as to eliminate the error due to non-adjustment of line of sight.
- e) Explain external distance of the simple curve.
- f) What is Mid-ordinate rule? Derive expression for it. (4M+4M+3M+4M+3M+4M)

PART-B

2. a) What are the different sources of errors in plane tabling? How are they eliminated?
 - b) What is two-point problem? How is it solved? (6M+10M)
3. Two points A and D are connected by a traverse survey ABCD and the following records are obtained
 AB = 219m; BC = 170.5m; CD = 245.75m
 Angle ABC = $118^{\circ}15'$; Angle BCD = $180^{\circ}40'$.
 Assuming that AB is in meridian, determine:
 - i) The latitude and departure of D relative to A.
 - ii) The length AD.
 - iii) The angle BAD. (16M)

4. In leveling between two points A and B on opposite sides of a river, the level was set up near A and the staff readings on A and B were 2.642 and 3.228m respectively. The level was then moved and set up near B, the respective staff readings on A and B were 1.086 and 1.664. Find the true difference level of A and B. (16M)
5. An ordinary theodolite is to be converted into an anallactic tachometer with a multiplier of 100 by an insertion of a new glass stadia diaphragm and an additional convex lens. Focal length of object glass is 15cm, fixed at a distance of 10cm from the trunnion axis. A focusing slide carries the eye-piece. If a suitable lens of 10 cm focal length is available for the anallactic lens, Calculate the fixed distance at which this must be placed from the objective and the spacing of the stadia hairs on the diaphragm. (16M)
6. A compound railway curve ABC is to have the radius of arc AB 600meters and that BC 400 meters. The intersection point V of the straights is located, and the intersection angle is observed to be $35^{\circ} 6'$. If the arc AB is to have a length of 200meters. Calculate the tangent distances VA and VC. (16M)
7. a) Calculate the volume of earth work by prismoidal formula in a road embankment with the following data:

Chainage along the centre line	0	100	200	300	400
Ground levels	201.70	202.90	202.40	204.70	206.90

Formation level at chainage 0 is 202.30, top width is 0.6 m side slopes are 2 to 1. The longitudinal gradient of the embankment is 1 in 100 rising. The ground is assumed to be level all across the longitudinal section.

- b) If the transverse slope of the ground at chainage 200 is assumed to be 1 in 10, find the area of embankment section at this point. (10M+6M)

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PART-A

1. a) What is a well conditional triangle? Why is it necessary to use well-conditioned triangles?
- b) What is local attraction? How is it detected and eliminated?
- c) Distinguish between the longitudinal section and cross-section.
- d) Explain how you would take field observations with a theodolite so as to eliminate the Error due to non-uniform graduations.
- e) Explain mid ordinate of the simple curve.
- f) What is trapezoidal rule? Derive expression for it. (4M+4M+3M+4M+3M+4M)

PART-B

2. a) Compare the advantages and disadvantages of plane table surveying with those of chain surveying.
 - b) State three-point problem plane tabling and describe its solution by trial method giving the rules which you will follow in estimating position of the point sought. (8M+8M)
3. For the following traverse, find the length of DE so that A, E and F may be in the same straight line:

Line	Length in m.	R.B.
AB	200	S 84° 30' E
BC	100	N 75° 18' E
CD	80	N 18° 45' E
DE	--	N 29° 45' E
EF	150	N 64° 10' E

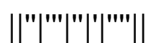
(16M)



4. The following staff readings were observed successively with level, the instrument having been moved forward after the second, fourth and eighth readings:
0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.765.
The first reading was taken with the staff held upon a benchmark of elevation 132.135. Enter the readings in level book-form and reduce the levels. Apply the usual checks. Find also the difference in level between the first and the last points. (16M)
5. The constant for an instrument is 1200 and the value of additive constant is 0.4 meters. Calculate the distance from the instrument to the staff when the micrometer readings are 6.262 and 6.258, the staff intercept is 2.5m and the line of sight is inclined at $+6^{\circ} 30'$, the staff being held vertically. (16M)
6. Two straights of a proposed road deflect through an angle of 120° . Originally, they were to be connected by a curve of 520meters radius. However, due to the revision of the scheme, the deflection angle is to be increased to 132° . Calculate the suitable radius of the curve such that the original starting point of the curve (P.C.) does not change. (16M)
7. The following notes refer to three level cross-sections at two sections 50 meters apart.

Station	Cross-section		
A	1.7/7.7	2.8/0	4.6/10.6
B	2.9/8.9	3.7/0	6.9/12.9

The width of cutting at the formation level is 10m. Calculate the volume of cutting between the two stations. (16M)



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PART-A

1. a) Explain clearly the principle of chain surveying.
- b) Compare the advantages and disadvantages of plane table surveying with those of chain surveying.
- c) Distinguish between the Curvature and Refraction.
- d) Explain how you would take field observations with a theodolite so as to eliminate the Index error of vertical circle.
- e) Explain length of the long chord of the simple curve.
- f) What is Simpson's one-third rule? Derive expression for it. (4M+4M+3M+4M+3M+4M)

PART-B

2. The following are the bearings taken on a closed compass traverse:

Line	F.B	B.B
AB	S 37 ⁰ 30' E	N37 ⁰ 30' W
BC	S 43 ⁰ 15' W	N 44 ⁰ 15' E
CD	N 73 ⁰ 00' W	S 72 ⁰ 15' E
DE	N 12 ⁰ 45' E	S 13 ⁰ 15' W
EA	N 60 ⁰ 00' E	S 59 ⁰ 00' W

Compute the interior angles and correct them for observational errors. Assuming the observed bearing of the line AB to be correct, Adjust the bearing of the remaining sides.(16M)



3. The following lengths and bearings were recorded in running a theodolite traverse in the counter clockwise direction, the length of CD and bearing of DE having been omitted.

Line	Length in m.	R.B.
AB	281.4	S 69° 11' E
BC	129.4	N 21° 49' E
CD	?	N 19° 34' W
DE	144.5	?
EA	168.7	S 74° 24' W

Determine the length of CD and the bearing of DE. (16M)

4. The following consecutive readings were taken with a level and 3 metres levelling staff on continuously sloping ground at a common interval of 20 meters:

0.602, 1.234, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824, 2.722. The reduced level of the first point was 192.122. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points and also the gradient of the line joining the first and the last points. (16M)

5. The stadia intercept read by means of a fixed hair instrument on a vertically held staff is 2.250 metres, the angle of elevation being $3^{\circ}42'$. The instrument constants are 100 and 0.4 m. What would be the total number of turns registered on a movable hair instrument at the same station for a 2.0 meters intercept on a staff held on the same point? The vertical angle in this case is $5^{\circ}30'$ and the constants 1000 and 0.4 m? (16M)

6. a) What is meant by 'shift' of a curve. Derive an expression for the same.
b) Explain the various methods of determining the length of a transition curve. (8M+8M)

7. Derive an expression for trapezoidal for volume. Compare it with the prismoidal formula.

(16M)