

Code No: A109210104

**R09****Set No. 2**

II B.Tech I Semester Examinations, November 2010

**SURVEYING****Civil Engineering****Time: 3 hours****Max Marks: 75**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Explain the construction of a simple telescope with the help of a neat sketch.  
 (b) Describe various types of eyepieces. Why inverting eyepieces are more popular? Explain. [7+8]
2. (a) Two straights AB and BC are intersected by a line  $D_1D_2$ . The angles  $BD_1D_2$  and  $BD_2D_1$  are  $40^{\circ}30'$  and  $36^{\circ}24'$  respectively. The radius of the first arc is 600m and that of the second arc is 800m. If the chainage of intersection point B is 8248.10m, find the chainages of the tangent point and the point of compound curvature?  
 (b) Derive relationship between the radius and the degree of curve. [15]
3. (a) Derive an expression to determine the area by coordinate method.  
 (b) What are the methods of determination of area from plan? Explain any one method with the help of a neat sketch. [7+8]
4. Define Geographic Information System? What are the various sources from which data can be derived to be used for GIS? [15]
5. (a) To determine the multiplying constant of a tacheometer the following observations were taken on a staff held vertically at a distance, measured from the instrument:

Observation	Horizontal distance in m	Vertical angle	Staff intercept
1	50	$+3^{\circ}48'$	0.500m
2	100	$+1^{\circ}06'$	1.000m
3	150	$+0^{\circ}45'$	1.500m

The focal length of the object glass is 20cm. and the distance from the object glass to trunnion axis is 10cm. The staff is held vertically at all these points? Find the multiplying constant?

- (b) Write short notes on:

- i. Stadia tables
- ii. Stadia diagrams.

[15]

6. Derive expressions for the limiting lengths of the offsets in terms of the scale and the angular error when there is:
  - (a) An error in the direction only

Code No: A109210104

**R09****Set No. 2**

- (b) The error in both direction and length. [7+8]
7. (a) Explain how you would measure with a theodolite the horizontal angle by repetition method?
- (b) Define the terms:
- i. Face right and face left observations
  - ii. Swinging the telescope. [10+5]
8. (a) Discuss the advantages and disadvantages of plane table surveying over other methods.
- (b) Explain with sketches, the following methods of locating a point by plane table survey. Also discuss the relative merits and application of the following methods:
- i. Radiation
  - ii. Intersection
  - iii. Resection. [5+10]

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Code No: A109210104

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1. Define the following terms:

- (a) Centering
- (b) Line of collimation
- (c) Horizontal axis
- (d) Vertical axis
- (e) Transiting.

[3+3+3+3+3]

2. (a) Discuss the subtense bar method of tacheometric surveying. What are its advantages?

- (b) Following readings were taken by a tacheometer from a station. The staff was kept vertical. The value of constant of tacheometer is 100 and is fitted with anallatic lens. Find out the horizontal distance from A to B and the reduced level of B: [15]

Station	Staff Station	Vertical angle	Hair reading	Remarks
A	B.M	$-6^{\circ}00'$	1.100, 1.153, 2.060	R.L of B.M = 976.0m
	B	$+8^{\circ}00'$	0.982, 1.085, 1.188	

3. (a) Differentiate between a level surface and a horizontal surface.

- (b) What is a bench mark? describe different types of bench marks. [7+8]

4. (a) How would you select a suitable peg interval for a circular curve? What do you understand by unit chord and sub-chord?

- (b) Two straight lines intersect at chainage 1150.50m and the angle of intersection is  $60^{\circ}$ . If the radius of the curve is 500m, Determine:

- i. Tangent Distance
- ii. Length of curve
- iii. Chainages of point of curvature and tangency
- iv. Length of long chord
- v. Degree of curve
- vi. Apex distance and the mid-ordinate .

[15]

5. (a) What is a well conditioned triangle? Why is it necessary to use Well-conditioned triangles?

Code No: A109210104

**R09****Set No. 4**

- (b) Describe various types of measuring chains? What are the advantages of a chain over a steel band? [7+8]

6. Write notes on:

- (a) Buffering in GIS  
 (b) Neighbourhood Functions  
 (c) Map overlay. [15]

7. Following is the data regarding a closed compass traverse PQRS taken in a clockwise direction:

- (a) Fore bearing and back bearing at station P=  $55^0$  and  $135^0$ , respectively  
 (b) Fore bearing and back bearing of line RS =  $211^0$  and  $31^0$ , respectively  
 (c) included angles  $\angle Q = 100^0$   $\angle R = 105^0$   
 (d) Local attraction at station R= $2^0$ W  
 (e) All the observations were free from all the errors except local attraction.

From the above data:

- (a) Calculate the local attraction at station P and S.  
 (b) Calculate the corrected bearings of all the lines and tabulate the same. [7+8]

8. A tract of land has three straight boundaries AB,BC, and CD, the fourth boundary DA is irregular. The measured length are as under:

AB=145m, BC=195m, CD=129m, BD=260m.

The offsets measured outside the boundary DA to the irregular boundary at a regular interval of 30m from D, are as below:

Distance from D(m)	0.0	30	60	90	120	150	180
Offsets(m)	0.0	3.8	4.8	4.4	.8	3.6	0.0

Determine the area of the tract. [15]

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Code No: A109210104

**R09****Set No. 1**

II B.Tech I Semester Examinations, November 2010

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1. The coordinates of traverse stations of a closed traverse ABCDE are given in table:

station	x(m)	y(m)
A	0	0
B	+180	+330
C	+460	+90
D	+330	-130
E	-50	-210

Calculate the area enclosed by the traverse. [15]

2. (a) What do you understand by indirect ranging? Describe in detail.  
 (b) Find the maximum permissible error in laying off the direction of offset so that the maximum displacement may not exceed 0.25 mm on the paper, given that the length of the offset is 10 metres, the scale is 20 m to 1 cm and the maximum error in the length of the offset is 0.3 m. [5+10]
3. Two straights AB and BC intersect at an inaccessible point B. Chainage of point M on the straight AB is 5865m from where the following theodolite traverse was run to another point N on the forward straight BC:

Side	Length	Included Angle
Ma	114.02 m	$\angle BMa = 18^{\circ}26'06''$
ab	131.02m	$\angle Mab = 204^{\circ}00'04''$
bc	94.34m	$\angle abc = 139^{\circ}14'55''$
cd	80.62m	$\angle bcd = 219^{\circ}07'49''$
dN	50.00m	$\angle cdN = 119^{\circ}44'42''$
NB	?	$\angle dNB = 73^{\circ}21'18''$

Calculate the necessary data for setting out a simple circular curve of radius 700m? [15]

4. (a) A level was set up at a point C at a distance of 100m from A and 1000m from B. The staff reading on the staff kept at A was 0.445m and that on the staff held at B was 2.845. Find the true difference in elevations of A and B.  
 (b) The staff reading taken on a staff held at a distance of 80 m from the instrument with the bubble central was 1.455m. When the bubble is moved 6 divisions out of the centre, the staff reading observed is 1.487m. If the length of one division is 2 mm, find the radius of the curvature and the sensitivity of the tube. [7+8]

Code No: A109210104

**R09****Set No. 1**

5. (a) State what errors are eliminated by repetition method? How will you set out a horizontal angle by method of repetition?  
(b) What is parallax? How can you eliminate it? [11+4]
6. (a) Explain the use of an anallactic lens in an external focusing telescope used in tacheometry. What are its advantages and disadvantages?  
(b) Determine the constants of a tacheometer if for the line of collimation horizontal, the stadia readings for the staff held at 25m and 50m are respectively 1.900, 1.410 and 2.22, 1.23. [15]
7. A Distance was measured using a 30 m steel tape in 4 sections: 30m, 30m, 30m and 26.455 m; total 116.455 m. the tape was supported at the two ends during the measurements. The field temperature was 30 °C and a tension of 100N was used. The tape was calibrated fully supported at a temperature of 20 °C using a tension of 75 N and had a length of 30.01 m. Compute the correct distance. Take the weight of the tape as 15 N and cross-sectional area as 0.02cm<sup>2</sup>. Coefficient of expansion =  $1.16 \times 10^{-5} / ^\circ\text{C}$ . Young's modulus =  $2.06 \times 10^2 \text{ N/mm}^2$ . [15]
8. (a) Discuss the method of Data recording and post processing in a Global Positioning systems?  
(b) Discuss the functioning of CR333 and CR344 GPS controllers? [15]

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Code No: A109210104

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1. Discuss in detail the various GPS surveying techniques? [15]

2. (a) To determine the gradient between two points A and B, a tachometer was set up at another station C and the following observations were taken keeping the staff vertical:

Staff at	Vertical angle	Stadia readings
A	$+4^{\circ}20'00''$	1.300, 1.610, 1.920
B	$+0^{\circ}10'40''$	1.100, 1.410, 1.720

If the horizontal angle ACB is  $35^{\circ}20'$ , determine the average gradient between A and B.  $k=100$  and  $C=0.0$ ?

- (b) Discuss the merits of anallactic telescope? [15]

3. In order to determine the elevation of the top Q of a signal on a hill, observations were made from two stations P and R. The stations P, R and the signal Q were in the same plane.

If the angles of elevation of the top Q of the signal measured at P and R were  $25^{\circ}35'$  and  $15^{\circ}5'$  respectively, determine the elevation of the foot of the signal if the height of the signal above its base was 4m.

The staff readings upon the bench mark (R.L = 105.42) were respectively 2.755 and 3.855m, when the instrument was at P and at R. The distance between P and R was 120m? [15]

4. (a) Describe the method of determination of area of a multilevel section by the method of independent coordinates.

- (b) Taking a suitable example discuss the method of partitioning of land by a line running in a given direction. [7+8]

5. In a closed traverse ABCDE, the bearing of the line AB was measured  $150^{\circ}30'$ . The included angles were measured as under

$\angle A = 130^{\circ}10'$ ;  $\angle B = 89^{\circ}45'$ ;  $\angle C = 125^{\circ}22'$ ;  $\angle D = 135^{\circ}34'$ ;  $\angle E = 59^{\circ}9'$ .

Calculate the bearings of all other lines. [15]

6. (a) What are the instruments used in chain surveying? How is a chain survey executed in the field?

- (b) Discuss various approximate methods of linear measurements. What is their importance? [7+8]

Code No: A109210104

**R09****Set No. 3**

7. The following data refer to right hand compound curve:

Total Deflection Angle= $80^{\circ}$

Radius of first arc=200m

Radius of second arc=250m

Chainage of the point of intersection=1504.80m

Deflection angle of the first arc= $50^{\circ}$

Determine the chainages of the point of curvature, the point of compound curve and the point of tangency.

Find also the remaining components of the curve. Compute the chord lengths if the normal chord is 20m? [15]

8. Following observations were taken for testing a dumpy level:

- (a) Instrument exactly at the midpoint of line AB.

Staff reading at station A= 1.855

Staff reading at station B= 1.605

- (b) Instrument very near to station B.

Staff reading at station A = 0.675

Staff reading at station B = 0.925

Find out from the above observations whether the line of collimation is in adjustment or not. If it is not in adjustment, what is the nature and amount of the error in distance ab? What will be the correct readings on staff at A and B from station B when the line of collimation is adjusted? [15]

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