

B.Tech/CE/3<sup>rd</sup> Sem/CIVL-2101/2015

2015

SURVEYING

(CIVL 2101)

Time Alloted : 3 Hours

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable. Symbols have their usual meanings.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : [10×1=10]
- i) A representative fraction of a scale of 1 cm = 2 km is  
(a) 1 : 2000                      (b) 1 : 20000  
(c) 1 : 200000                      (d) 1 : 2000000
- ii) A chain was used to mark a distance of 150 metres. The designated length of the chain was 30 metres. On testing the chain was found to be 30.01 m long. The actual length measured is  
(a) 149.95 m                      (b) 150.00 m  
(c) 150.05 m                      (d) 151.00 m

- iii) A 2° curve of chord length 20m has radius of  
(a) 573 m                      (b) 286.5 m  
(c) 143 m                      (d) 72.5 m
- iv) The distance formula for finding distances using a theodolite, for a horizontal line of sight, is  
(a)  $Ks + C$                       (b)  $K + Cs$   
(c)  $K/s + C$                       (d)  $K + C/s$
- v) A transition curve is essentially used to  
(a) generate more frictional forces for stability  
(b) allow vehicles to have increased speed while driving  
(c) neglect the effect of centrifugal forces  
(d) avoid abrupt changes in radius from a straight line to a finite radius curve
- vi) A negative reading in the levelling data means the staff is  
(a) read upside down  
(b) kept upside down  
(c) read through the objective lens  
(d) read with lower cross hair
- vii) In which position of the circle is the zero graduation in a prismatic compass is marked?  
(a) North end                      (b) South end  
(c) East end                      (d) West end
- viii) "D" being the distance (in km) between two points, combined correction for curvature due to earth and refraction is given in m by  
(a)  $0.0653D^2$                       (b)  $0.0673D^2$   
(c)  $0.0643D^3$                       (d)  $0.0683D^2$

- ix) True Bearing of a line is  $10^\circ$  and the magnetic declination is  $2^\circ$  W. Its Magnetic Bearing is :
- (a)  $2^\circ$  (b)  $8^\circ$   
 (c)  $12^\circ$  (d)  $20^\circ$
- x) Which instrument among the following is capable of measuring vertical angles?
- (a) dumpy level (b) theodolite  
 (c) cross staff (d) alidade

**GROUP - B**

2. (a) Define surveying. State the basic differences between Plane and Geodetic Surveying.
- (b) A 20m chain was tested before the commencement of the day's work and found to be 10 cm too short. After chaining 910 m the chain was found to be 20 cm too long. At the end of day's work, after chaining a total distance of 1526 m the chain was found to be 25cm too long. What was the true distance chained?
- 4+8 = 12**
3. (a) Briefly describe the Intersection method of Plane Table surveying with the help of a neat sketch.
- (b) Whole circle bearing of the lines of a traverse ABCDA are given below :-

| Line | Bearing         |
|------|-----------------|
| AB   | $70^\circ 30'$  |
| BC   | $120^\circ 45'$ |
| CD   | $223^\circ 30'$ |
| DA   | $320^\circ 47'$ |

Find the interior angles at A, B, C and D. **4+8 = 12**

**GROUP - C**

4. (a) The following consecutive readings were taken with a dumpy level: 0.886, 1.542, 2.986, 3.026, 0.954, 0.659, 0.581, 0.221, 1.523, 0.966 and 2.145. The instrument was shifted after the fourth and the eighth readings. The first reading was taken on the staff held on the bench mark of RL 850.000. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points and show checks. What is the difference of the levels between the first and last points?
- [CALCULATE THE REDUCED LEVELS BY RISE AND FALL METHOD.]
- (b) Write down the characteristics of contour lines. What do you mean by contour interval? **6+(4+2) = 12**
5. (a) To determine the elevation of station P in a tacheometric survey, the following observations were made with the staff held vertical. The instrument was fitted with an anallactic lens and its multiplying and additive constants were 100 and 0 respectively. If R.L. of B.M. is 250, calculate R.L. of station P.

| Instrument Station | H.I. (m) | Staff Station | Vertical angle | Staff readings (m)  |
|--------------------|----------|---------------|----------------|---------------------|
| O                  | 1.45     | B.M.          | $-6^\circ 00'$ | 1.335, 1.895, 2.460 |
| O                  | 1.45     | C.P.          | $+8^\circ 30'$ | 0.780, 1.265, 1.745 |
| P                  | 1.40     | C.P.          | $-6^\circ 30'$ | 1.155, 1.615, 2.075 |

- (b) Write short note on the "Repetition method" in measurement of horizontal angle using Theodolite.

**8+4 = 12**

**Group - D**

6. (a) A chain line was divided into eight sections of 12m each and offsets were taken from the chain line to a hedge. The lengths (in m) of the offsets were : 0, 5.2, 7.4, 8.6, 7.9, 8.5, 8.2, 9.1 and 7.6. Find the area between the chain line, the first and last offsets, and the boundary by (i) trapezoidal rule and (ii) Simpson's rule.
- (b) The deflection angle between the tangents of a circular curve is  $60^\circ$  and it is proposed to have a transition curve at its ends. The maximum speed of vehicles is assumed to be 100 kmph and the centrifugal ratio is  $\frac{1}{4}$ . The rate of change of radial acceleration is  $0.3\text{m/s}^3$ . Find the radius of the circular curve, length of the transition curve and chainages of the points at the beginning and end of the curves if the chainage of the point of intersection of the tangents is 1850m.
- 4+8 = 12**
7. (a) A curve has a radius of 400m and a deflection angle of  $40^\circ$ . The chainage of T1 is 1908.75m. Compute and tabulate the angles and theodolite readings to set out the curve by Rankine's Method.
- (b) Explain the following with necessary figures:
- (i) Back tangent, (ii) Deflection angle, (iii) Long chord and (iv) Tangent length
- 8+4 = 12**

**GROUP - E**

8. (a) Describe the Triangulation systems in brief.
- (b) Mention the various equipment used for sounding and describe them in brief.
- 4+8 = 12**
9. (a) Describe with a neat sketch Location of a sounding point by Tacheometry.
- (b) Explain briefly the following terminologies used in aerial photogrammetry:
- (i) Altitude
- (ii) Tilt and tip
- (iii) Principal point
- (iv) Tilted photograph
- 4+8 = 12**
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