

Code : PCC-CE-206 (101308)

( 2 )

**B.Tech 3rd Semester Special  
Exam., 2020**

**SURVEYING AND GEOMATICS**

Time : 3 hours

Full Marks : 70

**Instructions :**

- (i) The marks are indicated in the right-hand margin.  
 (ii) There are **NINE** questions in this paper.  
 (iii) Attempt **FIVE** questions in all.  
 (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following  
 (any seven) : 2×7=14

(a) The bearing S25°W is following whole  
 circle bearing

- (i) 155°  
~~(ii) 205°~~  
 (iii) 115°  
 (iv) 335°

(b) The horizontal angle between the true  
 meridian and magnetic meridian is  
 known as

- (i) magnetic dip  
~~(ii) declination~~  
 (iii) local attraction  
 (iv) magnetic bearing

(c) Which one of the following is not a  
 method of plane tabling?

- ~~(i) Orientation~~  
~~(ii) Radiation~~  
 (iii) Resection  
 (iv) Intersection

(d) After setting up a levelling instrument,  
 the first site to be taken as

- (i) foresight  
~~(ii) backsight~~  
 (iii) intermediate sight  
 (iv) Any of the above

(e) For a well-conditioned triangle, no angle  
 should be less than

- ~~(i) 20°~~  
~~(ii) 30°~~  
 (iii) 45°  
 (iv) 60°

- (f) Local attraction in compass surveying may exist due to
- (i) incorrect levelling of the magnetic needle
  - (ii) loss of magnetism of the needle
  - (iii) friction of the needle at the pivot
  - ~~(iv) presence of magnetic substances near the instrument~~
- (g) Which one of the following factors does not affect the scale of the aerial photographs?
- (i) Focal length
  - (ii) Flying height
  - ~~(iii) Ground elevation~~
  - ~~(iv) None of the above~~
- (h) The altitudinal distance of a geostationary satellite from the earth is about
- (i) 26000 km
  - (ii) 30000 km
  - ~~(iii) 36000 km~~
  - (iv) 44000 km

- (i) Which comparison of EDM and GPS processes is correct?
- (i) EDM and GPS signals are both reflected back to their sources
  - (ii) EDM measurements require atmospheric correction; GPS ranges do not
  - (iii) EDMs and GPS satellites both transmit modulated carriers
  - (iv) Phase differencing is used in EDM measurement but not in GPS

~~2~~ (a)

Explain the effects of curvature and refraction in levelling. 7

- (b) The following consecutive staff readings (in meters) were taken on pegs at 15 m interval on a continuously sloping ground :
- 0.895, 1.305, 2.800, 1.960, 2.690,  
3.255, 2.125, 2.830, 3.455, 3.896,  
1.680, 2.050 (Station A)

RL of station A where the reading 2.050 was taken is known to be 50.250. From the last position of the instrument two stations B and C with RL 50.800 and 51.000 respectively are to be established without disturbing the instrument. Work out the staff reading at B and C, and complete all the work in level book form. 7

3. (a) Discuss the advantages and disadvantages of plane table surveying over other methods of surveying. 7

(b) The following offsets were taken from a chain line to hedge :

	1	2	3	4	5	6	7	8	9
Distance (in m)	0	20	40	60	80	120	160	220	280
Offset (in m)	9.4	10.8	13.6	11.2	9.6	8.4	7.5	6.3	4.6

Compute the area included between the chain line, the hedge and the offset by (i) mid-ordinate rule, (ii) average ordinate rule, (iii) Simpson's rule and (iv) trapezoidal rule. 7

4. (a) Explain the methods of horizontal angle measurement using theodolite. 4
- (b) What are different types of arrangements used in triangulation? What are their relative advantages and disadvantages? 6
- (c) Find the RL of the top of a chimney from the following data :

Inst. station	Reading on BM	Angle of elevation	Remarks
A	1.265	18° 34' 20"	RL of BM = 242.830 m
B	1.625	10° 12' 40"	Distance AB = 60 m

Stations A and B and the top of the chimney are in the same vertical plane. 4

5. (a) Two straight lines intersect at chainage of 1050.50 m and the angle of intersection is 60°. If the radius of the simple circular curve is 500 m, determine (i) tangent distance, (ii) length of the curve, (iii) chainage of points of curvature and tangency, (iv) length of the long chord, (v) degree of curve, (vi) apex distance and (vii) the mid-ordinate. 7
- (b) A vertical curve is to be set out by pegs at 30 m interval to connect two uniform gradients of +2.5% and -1.5%. Calculate the length of the curve and reduced levels at first point, end point and summit point of the curve if chainage and reduced levels of the point of intersection are 1250 m and 825.85 m, respectively. Assume rate of change of grade as 0.1% per 30 metres. 7

6. Discuss the principle of electronic distance measurement. List down the types of electronic distance measurement instruments. Explain any one of them in detail. 7

(b) What are the advantages of total station? Discuss the errors in total station survey. 7

7. (a) Derive the basic equation for determine the scale of a vertical photograph. A vertical photograph was taken at an altitude of 1800 meters above mean sea level. Determine the datum scale of the photograph with respect to elevation and average scale of the photograph for a terrain lying at elevations of 100 m, 150 m, 170 m and 180 m, if the focal length of the camera is 25 cm. 7

(b) Explain flight planning in aerial photogrammetry. The scale of an aerial photograph is 1 cm = 100 m. The photograph size is 20 cm × 20 cm. Determine the number of photographs required to cover an area of 100 km<sup>2</sup>, if the longitudinal lap is 60% and the side lap is 30%. 7

8. Define GPS and explain various segments of GPS with suitable field applications. 7

(b) What are the different methods for measurement of position using GPS? Explain any one of them in detail. 7

9. (a) What is meant by idealized remote sensing system? Explain all basic components of idealized remote sensing system. 7

(b) Explain the interaction mechanism of EM radiation with Earth's surface, stating the basic interaction equation. 7

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