Code : 011508

B.Tech 5th Semester Exam., 2014

ADVANCED SURVEYING

Time : 3 hours *Full Marks* : 70

Instructions:

(i) All questions carry equal marks.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct option (any *seven*) :

(a) Different grades are joined together by a

(i) compound curve

(ii) transition curve

(iii) reverse curve

(iv) vertical curve

(b) If the angle of intersection of a curve is θ, then the deflection angle will be

(i) $\theta/2$

(ii) $180°-\theta$

(iii) $180°+\theta$

(iv) $90°+\theta$

(c) Total angle of deflection of a transition curve is

(i) spiral angle

(ii) spiral angle/2

(iii) spiral angle/3

(iv) spiral angle/4

(d) A broken-back curve is a type of

(i) horizontal curve

(ii) vertical curve

(iii) transition curve

(iv) reverse curve

(e) Which one is a correction to be applied in trigonometric levelling?

(i) Correction for dip

(ii) Correction for semidiameter of Sun

(iii) Axis signal correction

(iv) Parallax correction

(f) Mekometer has a range of

(i) 1 km

(ii) 3 km

(iii) 10 km

(iv) 50 km

(g) The towers used in triangulation are known as

(i) heliotropes

(ii) Bilby

(iii) Captain McCaw

(iv) Hunter

(h) Spherical excess in seconds is given by

(i) $\frac{A}{R^2} \times 206265$

(ii) $\frac{A}{R^2} \times \frac{1}{206265}$

(iii) $\frac{A}{R} \times 206265$

(iv) $\frac{A^2}{R} \times 206265$

(i) The major tide producing force is due to

(i) Sun

(ii) Mass

(iii) Venus

(iv) Moon

(j) For a celestial body, in astronomy, which is a function of line?

(i) Azimuth

(ii) Altitude

(iii) Hour angle

(iv) All of the above

2. (a) What are the different types of curve? Draw neat sketches of each.

(b) Two parallel lines 200 m apart are to be joined by a reverse curve with a deflection angle of 30°. If the radius of the first arc is 400 m and the chainage of the starting point of the curve 1500 m, calculate the radius of the second arc, the chainage of the point of reverse curvature and the finishing point of the reverse curve.

3. (a) Derive an expression for an ideal transition curve.

(b) Two straight lines AB and BC intersect at B, the chainage of B being 1500 m. Another line EF intersects AB and BC such that $\angle BEF = 30°30'$ and $\angle BFE = 40°30'$. The length EF is 175 m. Find the radius of the curve which will be tangential to AB, EF and BC. Also calculate the chainages of the tangent points.

4. Find the most probable values of the angles α, β and γ from the following observations at one station :

$\alpha = 38°12'26 \cdot 5''$	Weight = 1
$\beta = 32°45'13 \cdot 2''$	Weight = 2
$\alpha + \beta = 70°57'38 \cdot 6''$	Weight = 2
$\alpha + \beta + \gamma = 126°28'0 \cdot 6'$	Weight = 3
$\beta + \gamma = 88°15'37 \cdot 8''$	Weight = 1

5. *(a)* What are the corrections to be applied to the observed altitude of Sun?

(b) Calculate the azimuth of a star of declination 72°17′12″ N at eastern elongation in latitude 43°53′53″ N.

6. *(a)* Define the following :

(i) Strength of figure

(ii) Heliotropes

(iii) Spherical excess

(iv) Distance angles

(b) The elevations of points *A*, *B* and *C* are 100 m, 110 m and 125 m, respectively. The distance *AB* is 6 km and that of *BC* is 8 km. Will *B* create an obstruction to the line of sight from *A* to *C*? What will be the height of the signal required?

  Turn Over)

7. Determine the coordinates of the position of a ship *O*, an observer in the ship measured the angles of the stations *A*, *B* and *C* located on the sea shore—$\angle AOB = 62°20'00''$ and $\angle BOC = 40°30'00''$. The ship was south of the stations at the time of observation. The coordinates of the stations *A*, *B* and *C* were as follows :

Station	*Latitude*	*Departure*
A	0	0
B	500 N	1000 E
C	300 N	1500 E

8. Two stations *A* and *B* were at a distance 1800·50 m apart. Reciprocal observations were made to determine the difference of level between them. The following data was recorded :

Height of instrument at *A* = 1·463 m
Height of instrument at *B* = 1·457 m
Height of signal at *A* = 1·647 m
Height of signal at *B* = 1·762 m
Vertical angle from *A* to *B* = + 1°42′2″
Vertical angle from *B* to *A* = − 1°41′46″

Calculate also the height of *B* above *A*, using the vertical angle from *A* only. Assume the coefficient of refraction as 0·07.

9. *(a)* Explain the basic principle of EDM.

(b) Explain the functioning of a geodimeter and a distomat.

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