

B.E. Civil Engineering – Third Year – First Semester (Old) Exam - 2024

HIGHER SURVEYING

Time: 3 Hours

Full Marks: 100

Answer brief & to the point. Assume standard value for any parameter, if required

Answer ALL Questions

1. Assuming radius of earth as 6370Km, calculate the geodetic area enclosed within the spherical triangle with the following vertices – A (60° N, $20^\circ 30'$ E), B ($25^\circ 30'$ N, 35° E) and C ($62^\circ 30'$ N, $27^\circ 30'$ E). 15
2. Calculate the convergence of meridian between the points P (40° N, $5^\circ 30'$ E) and Q ($30^\circ 30'$ N, 5° E) 10
3. Draw a neat labelled diagram of the celestial sphere showing the location of the following – 15
 - a. Zenith and Nadir
 - b. Celestial Poles
 - c. First point of Aries and First point of Libra
 - d. Sun
 - e. A star with $36^\text{h}30^\text{m}$ and declination 20° N
 considering
 - a. Place of observation 40° N, 20° E
 - b. Time of observation 11^h LMT on 7^th September 2010
 - c. Equation of time = $+ 2^\text{m}36$
4. In a triangulation survey, the altitudes of two stations A and B, 120 km apart, are respectively 450 m and 700 m. The elevation of a peak P situated at 40 km from A has an elevation of 400 m. Ascertain if A and B are inter-visible, and if necessary, find by how much signal at B should be raised so that the line of sight nowhere be less than 1 m above the surface of ground. Take earth's mean radius as 6400 km and the mean coefficient of refraction as 0.07. Also find the maximum height of the point exactly midway between A & B that will not obstruct the final line of sight. 20
5. Discuss briefly on the relative advantages of Triangulation over Traversing. 5+15
A reciprocal levelling operation is carried out in between two stations A & B which are 4 Km apart. The observations noted are: H.I. at A = 1.45m, H.I. at B = 1.55m, H.S. at A = 2.9m, H.S. at B = 2.6m, Observed Angle of Elevation from A to B = $02^\circ 39' 40''$ and Observed Angle of Depression from B to A = $02^\circ 39' 50''$. Considering radius of earth as 6400Km find the Coefficient of refraction and Level difference between A and B.
6. The angles measured from a central station 'O' to the four stations A, B, C and D by the method of repetition are – AOB = $67^\circ 14' 30''$, BOC = $75^\circ 36' 20''$, COD = $59^\circ 56' 00''$, DOA = $157^\circ 13' 00''$. Using the principle of least square with conditional extremum, determine the most probable value of the angles. 8+12
The directions observed from a satellite station S, 70 m from a triangulation station C, to the triangulation station A, B, and C are $0^\circ 00' 00''$, $71^\circ 32' 50''$ and $301^\circ 16' 10''$, respectively. The lengths of AB, and AC are 16.5 km and 25.0 km, respectively. Deduce the angle ACB.