Ref. No EX/CE/T/ 311/2019 (Old)

B.E.Civil Engineering , Third Year , First Semester Examination , 2019(Old)

SUBJECT –Higher Surveying

Full Marks 100

Time: Three hours (50 marks for each part)

Use a separate Answer-Script for each part

PART - I

Answer any two questions

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1. (a) Assuming radius of earth = 6400 km calculate the geodetic area enclosed within the spherical triangle between places A ($82^0\ 53'$ E, $30^0\ 58'$ N), B ($40^0\ 12'$ E, $36^0\ 14'$ N) and C ($74^0\ 18'$ E, $27^0\ 31'$ N) ? 13

(b) The coordinates of places P and Q are given below.

P: latitude N $45^0\ 27'$ longitude W $15^0\ 41'$

Q: latitude N $36^0\ 40'$ longitude E $22^0\ 61'$

What is the "convergence' of meridian between the above two places? 12

2. (a) In order to determine the azimuth of a base line CJ by extra-meridian observation of the sun the instrument was set up at C and the following observations were recorded. 18

Table of Solar Observation

	Reference object	**Sun**	**Reference object**	**Sun**	**Remarks**
Face	Left	Left	Right	Right	
Observation in quadrant		First		First	
Horizontal circle reading	A $00^0\ 00'\ 00''$ B $180^0\ 00'\ 00''$	$24^0\ 39'\ 00''$ $204^0\ 38'\ 20''$	$180^0\ 00'\ 00''$ $00^0\ 00'\ 00''$	$213^0\ 49'\ 20''$ $33^0\ 48'\ 40''$	
Vertical circle reading	C D	$42^0\ 45'\ 40''$ $42^0\ 46'\ 20''$		$54^0\ 20'\ 00''$ $54^0\ 20'\ 40''$	
Altitude bubble reading	Object end Eye end	10 6		6 10	Sensitiveness of the bubble $2''$/div.
Time of observation		10h 26m IST		10h 58m IST	Date: Feb. 10, 1988

Find out the azimuth of the line CJ.

Given data: (i) Place of observation: Jadavpur University (lat. $22^0\ 31'$)

(ii) Refraction correction = $57''$ cot α

(iii) Horizontal parallax = 8.918"

(iv) Declination at 0^h GMT on 10.2.88 = - $19^0\ 18'\ 21''$ and on 11.2.88 = - $18^0\ 16'\ 32''$

(b) Derive the relation between LST at LMM and GST at GMM. 7

3. (a) Draw a neat diagram of the celestial sphere showing: 20

Zenith, nadir, celestial horizon

Celestial poles and equator

Ecliptic

First point of Aries and first point of Libra

Position of the sun

Position of a star, RA $38^h\ 31^m$ and declination 39^0N

Given data:

Place of observation, 40^0 N, 32^0 E

Time and date of observation, 15^h LMT on the 16^{th} May, 1978.

Equation of time = + $2^m\ 48^s$

(b) Write a note on geocentric parallax correction. 5

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B. E. CIVIL ENGINEERING THIRD YEAR FIRST SEMESTER EXAMINATION 2019 (Old)

HIGHER SURVEYING

Time: 3 Hours **Full Marks: 100**

Part II **(50 marks for each part)**

Use Separate Answer scripts for each Part
Answer ALL Questions

1. Write short notes on the following – 5×5=25
   a. Normal Tension
   b. Reduction to Centre
   c. Extension of Base
   d. Corrections for a Braced Quadrilateral
   e. Least Square Theory under Conditional Extremum

2. In a triangulation survey, the altitudes of two stations A and B, 110 km apart, are respectively 440 m and 725 m. The elevation of a peak P situated at 65 km from A has an elevation of 410 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 3 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. 12+3

3. A reciprocal levelling operation is carried out in between two stations A & B which are 4.5 Km apart. The observations noted are – H.I. at A = 1.5m, H.I. at B = 1.55m, H.S. at A = 3m, H.S. at B = 2.6m, Observed Angle of Elevation from A to B = 02°39'49" and Observed Angle of Depression from B to A = 02°39'56". Considering radius of earth as 6400Km find the Coefficient of refraction and Level difference between A and B. 10