

TCE-403

453

## Even Semester Examination - 2017

### B.TECH. (IV SEMESTER)

### ADVANCED SURVEYING

**Time: 03:00 Hours**

**Max Marks : 100**

**Note:** Attempt **all** questions, each question carry **equal** marks.

Q1. Attempt any FOUR questions [4 x 5]

- (i) Derived the expression for phase correction
- (ii) The altitudes of two proposed stations A and B, 80 km apart are respectively 225 m and 550 m. The intervening obstruction situated at C, 40 km from A has an elevation of 285 m. Ascertain if A and B are inter-visible, and if necessary, find by how much B should be raised so that the line of sight must nowhere be less than 3 m above the surface of the ground.
- (iii) Explain the Kinds of Error.
- (iv) The angles of a triangle  $\triangle ABC$  were recorded as follows:

$$A = 77^{\circ}14'20'' \text{ weight } 4$$

$$B = 49^{\circ}40'35'' \text{ weight } 3$$

$$C = 53^{\circ}04'52'' \text{ weight } 2$$

Solve it by methods of correlates.

- (v) An angle A was measured by different persons and the following are the values:

Angles	Number of measurements
$65^{\circ}30'10''$	2
$65^{\circ}29'50''$	3
$65^{\circ}30'00''$	3
$65^{\circ}30'20''$	4
$65^{\circ}30'10''$	3

Find the most probable value of the angle

- (vi) Find the azimuth and altitude of a star from the following data.

$$\text{Latitude of the place} = 46^{\circ}\text{N}$$

$$\text{Hour angle of the star} = 20^{\text{h}}40^{\text{m}}$$

$$\text{Declination} = 18^{\circ}38'\text{S}$$

Q2. Attempt any FOUR questions [4 x 5]

- (i) Write down the Laws of Weight
- (ii) Write down the Rules for figure adjustment.
- (iii) Find the G.M.T corresponding to the local mean time of  $10^h 20^m 6^s$  a.m. at places having longitudes: (i)  $48^{\circ} 36' E$  and (ii)  $48^{\circ} 36' W$
- (iv) The following are the measured values of equal weight for two connected triangles ACD and BCD:

A	$68^{\circ} 12' 24''$	$C_1$	$62^{\circ} 18' 40''$
B	$52^{\circ} 28' 46''$	$C_2$	$65^{\circ} 57' 51''$
C	$128^{\circ} 16' 30''$	$D_1$	$49^{\circ} 28' 59''$
D	$111^{\circ} 02' 25''$	$D_2$	$61^{\circ} 33' 28''$

Adjust the values of the angles.

- (v) Adjust the following station observations:

$$A = 34^{\circ} 18' 20.4'' \quad \text{weight 1}$$

$$B = 28^{\circ} 32' 12.8'' \quad \text{weight 2}$$

$$C = 22^{\circ} 48' 32.6'' \quad \text{weight 2}$$

$$A + B = 62^{\circ} 50' 29.6'' \quad \text{weight 2}$$

$$A + B + C = 85^{\circ} 39' 08.6'' \quad \text{weight 1}$$

Adjust the angles & solve it by methods of Differences

- (vi) Determine the declination and hour angle of stars for the following data.

Star	Altitude ( $\alpha$ ) of star	Azimuth (A) of star	Latitude( $\theta$ ) of observer
S1	$22^{\circ}$	$50^{\circ}\text{W}$	$49^{\circ}20'\text{N}$
S2	$22^{\circ}$	$150^{\circ}\text{E}$	$49^{\circ}20'\text{N}$
S3	$22^{\circ}$	$50^{\circ}\text{E}$	$49^{\circ}20'\text{N}$

Q3. Attempt any TWO questions [2x 5]

- (i) What do you understand by GPS? Give an overview of GPS also explain segments of GPS?
- (ii) Define (1) The altitude (2) The azimuth (3) The declination (4) the prime vertical (5) The zenith and nadir

- (iii) The following are the measured values of equal weight for two connected triangles ACD and BCD:

$$A \quad 68^{\circ}12'24'' \qquad C_1 \quad 62^{\circ}18'40''$$

$$B \quad 52^{\circ}28'46'' \qquad C_2 \quad 65^{\circ}57'51''$$

Q4. Attempt any TWO questions [2x 5]

- (i) Two straight meet at an intersection angle of  $55^{\circ}$ . Connect the straights with a compound curve consisting of arc of radii 200m and 350 m. the chainage of intersection points being 1000m the arc of radius 200m curves out of the straight at chainage of 880 m. Calculate the forward tangent length and the central angles of the arcs constituting the compound curve.

- (ii) A road bend which deflects  $80^{\circ}$  is to be design for a maximum speed of 100 km per hour, a maximum centrifugal ratio of  $\frac{1}{4}$  and maximum rate to the change of acceleration of  $30\text{cm/sec}^3$ , the curve consisting of a circular arc combined with two cubic spirals. Calculate (a) the radius of the circular arc, (b) the requisite length of

transition (c) the total length of the composite curve, and (d) the chain ages of the beginning and end of transition curve and of the junctions of the transition curves with the circular arc if the chainage of the P.I is 42862m.

- (iii) Describe the raster and vector data structures. What are the relative advantages and disadvantages of the two data structures?

Q5. Attempt any TWO questions [2x 5]

- (i) From an eccentric station S, 12.25 m to the west of the main station B, the following angles were measured angles BSC and CSA are  $76^{\circ}25'32''$  and  $54^{\circ}32'20''$  respectively. The stations S and C are to the opposite sides of the line AB. Calculate the correct angles ABC if the lengths AB and BC are 5286.5 and 4932.2 m respectively.

$$C \quad 128^{\circ}16'30'' \qquad D_1 \quad 49^{\circ}28'59''$$

$$D \quad 111^{\circ}02'25'' \qquad D_2 \quad 61^{\circ}33'28''$$

Adjust the values of the angles.

- (ii) The observations were made for  $\alpha$ -lyrae (vega) at Allahabad on 17<sup>th</sup> July 1992. The declination of star was  $38^{\circ}45'48''$ N and the hour angle was  $80^{\circ}57'48''$ . Find the co-ordinates of star vega in horizon system. It means i.e. altitude azimuth system (latitude of Allahabad is  $25^{\circ}25'25''$ ).
- (iii) Explain how data can be converted from (a) vector to raster format (b) raster to vector format

\*\*\*\*