

Fifth Semester B. E. (Civil Engineering) Examination

SURVEYING - II

Paper - 5 CE 04

(USC - 10193)

P. Pages : 4

Time : Three Hours]

[Max. Marks : 80

- Note :** (1) Due credit will be given to neatness and adequate dimensions.
(2) Assume suitable data wherever necessary.
(3) Diagrams and Chemical equations should be given wherever necessary.
(4) Retain the construction lines.
(5) Illustrate your answer wherever necessary with the help of neat sketches.
(6) Use of slide rule, logarithmic tables, Steam tables, Mollier Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted.
(7) Use pen of Blue/Black ink/refill only for writing the answer book.

1. (a) Derive the expression for distance and elevation between staff and instrument station when line of sight is inclined upward and staff held was vertical at observation station in case of fixed hair method of techometric survey. 6
(b) Two distances of 20.0m and 100.0 m were accurately measured out and the intercepts on the staff between the outer sliding webs were 0.196 m at the former distance and 0.996 m at the later. Calculate the techometric constants. 7

OR

2. (a) In tangential method (movable hair method) derive the equations for horizontal and vertical distances from instrument to the staff station if one angle is angle of elevation and one angle is angle of depression. 6
(b) To determine multiplying constants of a techometer the following observations were taken on a staff held vertically at distance measured from the instrument.

Observations	Hr. Distance in 'm'	Vr. Angle	Staff intercept
1	50.0	+ 3° 48'	0.50 m
2	100.00	+ 1° 6'	1.00 m
3	150.0	+ 0° 36'	1.500 m

7

3. (a) Draw a figure showing all components of a simple circular curve and define the following terms :—
- (i) Point of intersection
 - (ii) Backward tangent
 - (iii) Point of curve
 - (iv) Point of tangency
 - (v) Long chord
 - (vi) Deflection angle. 6
- (b) Two straights AB and BC intersect at chainage 1316.20 m. The deflection angle being $62^{\circ}45'$.
It is proposed to insert a circular curve of 300.0 m radius to connect two straights.
It is intended to set out curve by offset from chord produced method. Calculate the necessary offsets and change of prominent points. Take peg interval as 20.0 m. 7

OR

4. (a) Enlist various methods of determining length of transition curve and discuss any one method. 6
- (b) A transition curve is required for a circular curve of 250.0 m radius. The gauge being 1.676 m and maximum super elevation restricted to 0.150 m. The transition is to be designed for a velocity such that no lateral pressure is imposed on rails and rate of gain of radial acceleration is $0.30\text{m/sec}^2/\text{sec}$. Calculate the required length of transition curve and design speed. 7
5. (a) Discuss various triangulation figures and their respective suitability in view of shape of area covered. 6
- (b) Two triangulation stations A and B are 50.0 km apart have elevations 242.0 m and 258.0 m respectively. The intervening ground may be assumed to have a uniform elevation of 216.0 m. Find the minimum height of signal required at B so that line of sight may not pass nearer the ground than 2.50 m. 8

OR

6. (a) From an eccentric station S, 12.25 m to the west of main station B following angles were measured, $\angle BSC = 76^{\circ}25'32''$, $\angle CSA = 54^{\circ}32'20''$. The stations S and C are to the opposite side of line AB. Calculate the correct angle ABC, if length of AB and BC are 5200.0 and 4900.00 m respectively. 6

(b) Define the following terms :—

(i) Signals and towers,

(ii) Most probable value of observations,

(iii) Weighted observations,

(iv) Equipments required for base line measurement. 8

7. (a) Discuss various instruments used in sounding survey. 7

(b) What is three point problem in hydrographic surveying. Discuss any one graphical method for three point problem. 7

OR

8. (a) The horizontal angle between two points A and B observed with the side telescope (auxillary) of a mining transit is $36^{\circ}22'$. The distance between centres of main and auxillary telescope is 6.0 cm. The distances A and B from the auxillary telescope are 25.25 m and 17.36 m respectively. Reduce the angle to the centre. 7

(b) How the surface level is transferred down shaft using 'Weisbach' triangle method. 7

9. (a) What is relief displacement in aerial photograph. Derive equation for relief displacement on a vertical photograph. 6

(b) The scale of a photograph is 1 cm = 100 m and the size of a photograph is 25 cm x 25 cm. Determine the number of photographs required to cover an area of 200.0 km². Take longitudinal overlap as 70% and side overlap as 20%. 7

OR

10. (a) Define the following terms :—

- (i) Crab
- (ii) Drift
- (iii) Oblique photograph
- (iv) Perspective projection
- (v) Flying Height
- (vi) Vertical photographs.

6

(b) A transmission tower 50.0 m in height appears to be in a vertical photograph taken at a flight altitude of 2500.00 m above M. S. L. The distance of image of the top of tower 6.36 cm.

Compute the displacement of the image of the top of tower with respect to bottom. The elevation of the bottom of tower is 1250.00 m.

7

11. (a) Determine azimuth and altitude of a star from the following data :—

- (i) Declination of star = $21^{\circ}40'$
- (ii) Hour angle of star = $41^{\circ}03'$
- (iii) Latitude of observer = $49^{\circ}N$.

7

(b) What is circumpolar star ? Show that for a star to be circumpolar its declination must be greater than Co-latitude of place of observation.

6

OR

12. (a) Discuss the advantages and disadvantages Global Positioning System.

6

(b) Calculate the distance in nautical miles between A and B, along the parallel of latitude using following data :—

Latitude of A = $23^{\circ}12'S$

Latitude of B = $23^{\circ}12'S$

Longitude of A = $90^{\circ}25'W$

Longitude of B = $140^{\circ}20'E$

7

