53 (CE 401) SURV-II

2019

SURVEYING–II

Paper : CE 401

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* What is the principle of Two-Theodolite Method for setting out simple circular curve? Explain its procedure. 5

(b) The following perpendicular offsets were taken from a chain line to a hedge :

Chainage :	0	15	30	45	60	70	80	100
Offsets :	6·20	7·40	9·80	12·00	14·20	10·20	9·30	8·20

Calculate the area between the survey line, the hedge and the end offsets by —

(i) Trapezoidal rule

(ii) Simpson's rule. 5+5

Contd.

(c) The scale of an aerial photography is $1cm = 100m$. The photograph size is $20cm \times 20cm$. Determine the number of photographs required to cover an area of $10km \times 10km$, if the longitudinal lap is 60% and the side lap is 30%. 5

2. (a) Write a note on the application of GIS and GPS in the field of surveying. Also give its advantages and disadvantages. 8

(b) Explain *any two* methods to determine the intervisibility between triangulation stations. 6

(c) What is Photogrammetry ? Differentiate between a map and an aerial photograph. 6

3. (a) Differentiate between : 2×2

(i) Point of intersection and point of tangency in circular curve.

(ii) Transition curve and Reverse curve.

(b) A satellite station '*S*' is at a distance of $5{\cdot}8m$ from the main triangulation station '*A*', the following observations were observed.

A	0°0′0″
B	132°18′30″
C	232°24′6″
D	296°6′11″

The length *AB*, *AC* and *AD* were computed to be $3260{\cdot}5m$, $4020{\cdot}2m$ and $3086{\cdot}4m$ respectively. Determine the directions of *AB*, *AC* and *AD*. 10

(c) Derive the formulae for height and distance of staff station for an inclined line of sight at an angle of elevation when the staff is held vertically in a tacheometric survey. 6

4. *(a)* The following observations were made with a tacheometer fitted with an anallactic lens $K = 100$. 10

Inst. Station	Ht. of axis	Staff Station	Vertical angle	Hair readings
P	1·6	B.M.	+4°16′	0·964, 1·562, 2·042
P	1·6	Q	+7°3′	0·814, 1·342 1·854
Q	1·5	R	+10°20′	1·824, 2·441, 3·032

Compute the reduced levels of P, Q and R and the horizontal distances, PQ and QB.

(b) Find out the desired data to compute a flight mission for an area 6*km* wide and 12*km* long. The airplane has a speed of 190*km/h*. A camera with a focal length of 21*cm* is to be used. The approximate scale is 1 : 10,000, the average elevation of the ground is 366*m* and the photographs are to be 25*cm* × 25*cm*. The forward lap is 60% and the side lap is 25%. 10

5. *(a)* Two tangents intersect at chainage 59 + 60, the deflection angle being 50°30′. Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents if it is intended to set out the curve by offsets from chords produced. Take peg interval equal to 100 links, length of the chain being equal to 20*m* (100 links). 10

(b) A tacheometer was set up at station *A* and the readings on a vertically held staff at *B* were 2·255, 2·605 and 2·955, the line of sight being at an inclination of +8°16′. Another observation on the vertically held staff at B.M. gave the readings 1·640, 1·920 and 2·200, the inclination of the line of sight being +2°12′. Calculate the horizontal distance between *A* and *B* and the elevations of *B* if the R.L. of B.M. is 418·642*m*. The constants of the instruments were 100 and 0·4. 5

(c) A railway embankment 400*m* long is 12*m* wide at the formation level and has the side slope 2 to 1. The ground levels at every 100*m* along the centre line are as under :

Distance	0	100	200	300	400
R.L.	202·4	212·4	204·12	208·14	210·12

The formation level at 0 chainage is 200·00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork. 5

6. (a) What is electromagnetic spectrum? State the wavelength regions, along with their uses, for remote sensing applications. 6

(b) Explain the procedure to set out simple circular curve by method of ordinates from the long chord. 6

(c) Draw the diagram of an idealised remote sensing system. What do you understand by remote sensing? Differentiate between active and passive remote sensing. 8

7. (a) Derive the expressions and explain the procedure to set out simple circular curve by offsets from the tangents. Consider both radial and perpendicular offsets. 10

(b) Two straight lines *AB* and *BC* are intersected by a line D_1D_2. The angles BD_1D_2 and BD_2D_1 are 40°30′ and 42°30′ respectively. The radius of the first arc is 800*m*. If the chainage of intersection point *B* is 8240·2*m*, find the chainage of the tangent points and the point of compound curvature. 10