Total No. of printed pages = 8

CE 131404

Roll No. of candidate

2017

B. Tech 4th Semester End-Term Examination

ENGINEERING SURVEYING - II

Full Marks–100   Pass Marks–35   Time–Three hours

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

1. Explain any *six* of the following terms :

    $6 \times 2 = 12$

    (i)   Phase of a signal

    (ii) Normal equation

    (iii) Flying height

    (iv) Basenet

    (v)   Stereoscope

    (vi) Remote sensing

    (vii) Total station.

[Turn over

2. Answer any *six* from the following questions :

6×3=18

(i) Derive an expression showing the relation between radius and degree of a curve.

(ii) What are the advantages and disadvantages of trilateration ?

(iii) Calculate the weights of $(A + B)$ and $(A - B)$ if the measured values and weights of A and B are :

$A = 48° 50' 30"$ weight = 4

$B = 32° 30'25"$ weight = 3

(iv) In an aerial survey, three points A, B and C are selected on a photograph where height of the aircraft above mean sea level is 4000m and focal length of camera lens is 150 mm. The elevation points A, B and C are 1500m, 800m and 1200m respectively. Find out the average scale of the photograph.

(v) Adjust the following observed angles of a triangle which were observed with equal precision :

$P = 62° 15' 20"$

$Q = 56° 33' 40"$

$R = 61° 11' 15"$.

(vi) The probable error of direction measurement is 1.25 seconds. Compute the maximum value of R if the maximum probable error desired is 1 in 20,000.

(vii) Write down the different operations which consist the routine of a triangulation survey.

3. Answer any *eight* from the following questions :

8×5=40

(i) Prove that, in triangulation, an isosceles triangle is a well conditioned triangle with two angles opposite to the equal sides, approximately equal to 56° 14'.

(ii) Explain with a neat diagram, how electro-magnetic energy interacts with matter.

(iii) What are the different types of horizontal and vertical curves generally used ? What are the objectives of providing transition curves in railways and highways ?

(iv) A cylindrical signal of diameter 2 metres was erected at station Q. Observations were made on the signal from station P. Distance between P and Q is 7120 metres and the bearings of the Sun and the station Q are 280° and 45° respectively. Calculate the phase correction when the observation was made :

(a) on the bright portion

(b) on the bright line.

(v) From a satellite station S, 40m to the right of main station C, the angles observed were as follows :

$< BSA = 69° 50' 40"$

$< ASC = 58° 30' 15"$

Length of sides AC and BC are 18 km and 25 km approximately. Calculate the angle ACB.

(vi) A theodolite was set up at a distance of 200m from a tower. The angle of elevation to the top of tower was 8°18' while the angle of depression to the base of the tower was 2°24'. The staff reading on the BM having RL 248.362m with the telescope horizontal was 1.286m. Find out the height of the tower and RL of the top of the tower.

(vii) Find out the MPV of the angles X, Y and Z of the triangle XYZ from the following data using method of correlates :

Angle	Observed values	Weight
X	86°35'11.1"	2
Y	42°15'17.0"	1
Z	51°09'34.0"	3

(viii) The photo co-ordinates of the images a and b of two points A and B respectively measured on a vertical photograph taken at a flying height of 1600m from a camera having lens of focal length 150mm are given below :

	Co-ordinates	
	X(mm)	Y(mm)
a	− 46.35	− 48.20
b	+ 38.48	+41.62

The elevation of A and B above mean sea level are 140m and 220m respectively. Determine the distance AB.

(ix) Calculate $(D - C) / D$ for the following triangulation figures. Arrows indicate the directions observed :

(a)

(b)
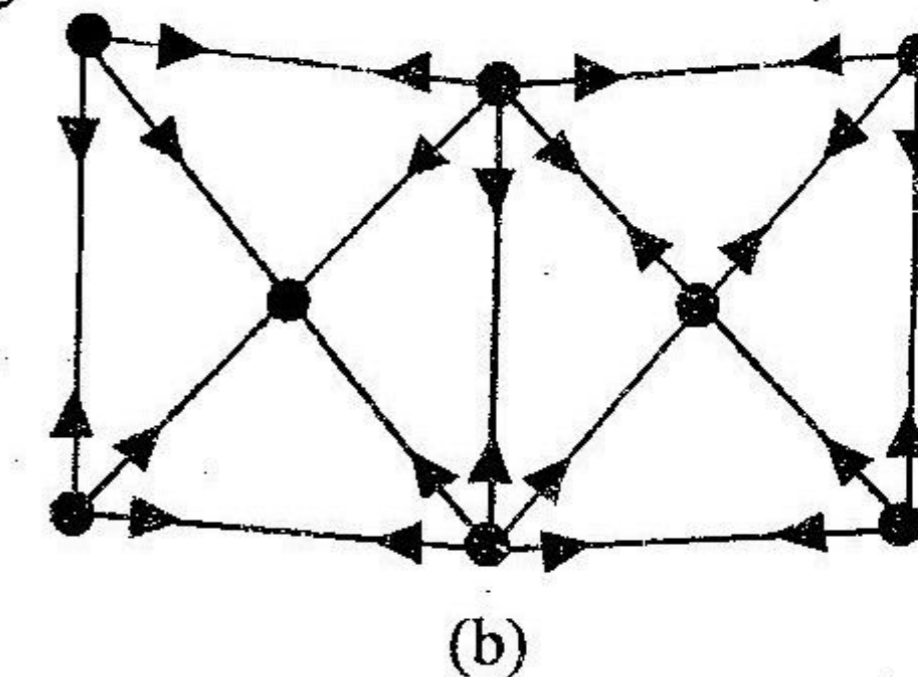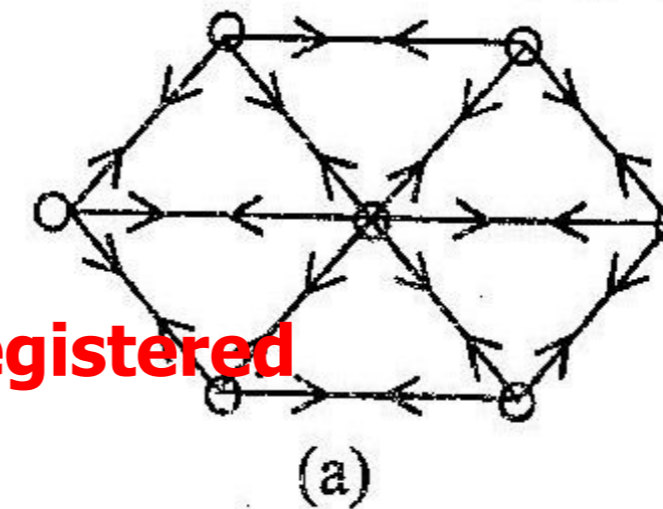
(x) What do you understand by relief displacement on a vertical photograph ? Derive an expression for its determination.

4. Answer any *three* from the following questions :

$3 \times 10 = 30$

(i) Two tangents intersect at chainage 1130m. The angle of intersection is 145°. Calculate all the data necessary for setting out a curve of radius 270m by the Rankine method. The peg interval may be taken as 20m. Do the necessary field checking.

(ii) Two stations P and Q, 120km apart have elevations 210m and 1050m above mean sea level respectively. The altitudes of two stations L and M on the profile between P and Q are 330m and 557m above mean seal level and PL = 50km, PM = 80km. Determine whether P and Q are intervisible or not and if necessary find out the minimum height of scaffolding at Q assuming P as the ground station. Line of sight should clear the intervening peaks at least by 3m.

(iii) The following observations were made at one station :

Observed angle	Weights
A = 75° 32'46.3"	3
B = 55°09'53.2"	2
C = 108° 09'28.8'	2
A+B = 130° 42'41.6"	2
B+C = 163° 19'22.5"	1
A+B+C = 238° 52'9.8"	1

Find out the most probable values of A, B and C by method of differences.

(iv) For conducting an aerial survey, following data are given :

Length of ground along N-S direction = 30 km

Length of ground along E-W direction = 24 km

Focal length of camera = 30 cm

Photograph size = 20 cm × 20 cm

Average scale = 1 : 12,000

Average elevation above datum = 400m

End lap = 60%

Side lap – 30%

Ground speed of the aircraft = 220km/hr
For the flight plan, calculate :

(a) flying height of the aircraft

(b) total number of photograph

(c) exposure interval.