Bachelor level/ B.E. Civil /4ᵗʰ Semester   Full Marks: 50
Time: 3 hours   Pass Marks: 25
Subject: Surveying II (CE210/CE442)

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

1. a) Write the principle of tacheometry and derived the expression for horizontal and vertical distance **[1+4]** for the tangential system of the tacheometry when both sights are angle of depression.

   b) Calculate the RL difference and gradient between stations P and Q from the given data which are **[5]** observed by a tacheometer from station O. Staff was vertically held at P and subtense bar at Q. The subtended angle between the instrument and 3.0m long subtense bar was 0°45'25".

Inst. Station	Target	Bearing	Zenith Angle	Staff readings (m)	Subtense Bar
O	P	320°25'	96°55'	0.550,1.15 0,1.750	X
	Q	35°55'	86°25'	X	1.450m

2. a) In a trigonometrical levelling a hill station P was sighted from two instrument stations A and B **[5]** which were at very different level but with same line of sight to that of target and following information were noted;

Inst. Station	H.I(m)	Target	Zenithal angle		Distance
			FL	FR	
A	1.400	P	65°20'	295°40'	AB=135m
B	1.500	P	69°52'	290°10'	
A	1.400	B	102°30'	257°05'	

   Determine the R.L of P, If RL of B was 2550.450m and vane height while sighting from A to B was 2.5 m above foot of the vane.

   b) Explain the factors controlling the contour interval? Explain the arithmetic interpolation of **[2+3]** contouring with suitable example.

3. a) How can you find the coordinate of unknown station from three-point resection in field? The **[2+3]** coordinates of three stations A, B and C are given and a point O is set up in the respected field and observation were made. Calculate the coordinate of station by Tienstra Method

Station	Easting	Northing	Angle
A	24078.31	29236.48	< BOA = 140°40'45"
B	26266.48	31493.20	< COB = 93°12'15"
C	28377.67	29661.04	< AOC = 125°03'00"

   b) Explain the purpose of construction survey. Write the steps of setting out the bridge on ground. **[2+3]**

4. a) Write the elements of Transition curve with sketch. Compute and tabulate the data required for setting out a simple circular curve by Rankine's method from the following information: [2+4]
    Angle of intersection = $155^0 35'$
    Chainage of point of intersection = 3+450m
    Degree of curve = 3^0
    Peg interval = 20m

    b) A down grade of 1.5% is followed by an upgrade of 2.5%. The reduced level of the point of intersection is 90.00 m and its chainages 450 m. A vertical parabolic curve 180 m long is to be introduced to connect the two grades. The pegs are to be fixed at 20 m intervals. Calculate the elevations of the points on the curve. [4]

5. a) Define photogrammetry and its merits and demerits. Derive the expression for relief displacement. What are the field applications of G.I.S.? [1+3+2]

    b) Write the working principle of GPS. What are the features of total station? [2+2]

THE END