Majmaah University **College of Engineering**

Civil and Environmental Engineering Department **2018-19/2**

Sheet #4

Tacheometric Problems

Note: ***You are required to submit the answers in a report within one week (hand writing)***

1. Theodolite is set up at one end of a level base line 150 m long. The line is market by stakes every 30m and a stadia rod is held at each stake. The stadia difference at each location is observed as follows: 0.302, 0.600, 0.899, 1.207 and 1.506 meters, respectively. Compute the stadia interval factor (K) for each distance and also determine the average value of K.

2. A tachemeter was set up somewhere at mid-length of a long-span steel bridge. The rod readings tabulated below were observed on a stadia rod held successively at the southern and northern approaches of the bridge. If the stadia interval factor of the instrument is 98.5, determine the length of the bridge.

Rod position	Hair readings		
	Upper	Middle	Lower
Rod at Southern Approach	2.98 m	1.68 m	0.38 m
Rod at Northern Approach	3.54 m	2.02 m	0.49 m

3. The reading of the middle hair on a staff located at point B at a distance = 1200 m from the instrument was recorded as 3.00 m. If the vertical angle is 1^{o} 30'. The reduced level of the instrument was 250.50m and the height of the instrument is 1.6m. Find the reduced level of the staff station.

4. Determine the gradient from point A to point B from the following observations made with a tacheometer. The constant of the instrument was 100 and the staff was hold vertically.

Occ. Point	Target point	Bearing	Vertical angle	Staff readings
O	A	134°	+10 24′	1.360 , 1.195
	B	224°	+05 06′	1.065 , 1.885

5. To determine the gradient between two points A and B a tachemeter was set up at another station C and the following observations were taken, keeping the staff vertically:

Point	Vertical angle	Staff readings
A	+04 20′ 00′′	1.300, 1.610, 1.920
B	+00 10′ 40′′	1.100, 1.410, 1.720

If the horizontal angle ACB 35 20′ 00′′. Determine the average gradient between A and B. (K =100 and e =0).

6. Determine the gradient from point P to point Q from the following observations carried out with a tacheometer. Assume that the staff held vertical and that the multiple constant of the instrument is 100.

Occ. Point	Target point	Bearing	Vertical angle	Staff readings
O	P	340°	+17 00′	0.760, 1.455, 2.170
	Q	70°	+10 00′	0.655, 1.845, 3.150

Good Luck