Mansoura University
Summer course Exam August 2013)
Time Allowed: 3 hours
Plane Survey (NPWE1)

Faculty of Engineering
BCE Program
Full Mark: 100 marks
No. of pages:2

Answer the following questions:

The first question (16 Marks) :

1. Design a vernier reads to (1/16) inch, the main scale graduated to inches and (1/4) inches. Show the scale when reading (135/16) inches.   **(8 Marks)**

2. A line was measured with a 30 m tape standardized at 20°C under a pull of 10 kg. The temperature during measurement was 30°C and the pull was 15 kg. Find the total correction per tape length in centimeters due to temperature, sag and tension. Given the following data: coefficient of expansion = $3.5 *10^{-6}$ /°C, modulus of elasticity $2.1*10^6$ kg/cm^2 , cross sectional area of the tape=0.02 cm^2 and weight of the tape = 0.80 kg.   **(8 Marks)**

The second question (14 Marks):

The two lines AB and AD of a closed traverse ABCDA are measured by an instrument (100,0).The following observations were taken as follows:

Instrument station	Staff station	Bearing	Stadia readings	Vertical angles
	B	128°	(1.00,1.95,2.90)	+5° 00´
A				
	D	308°	(1.10,2.15,3.20)	-5° 00´

Calculate:

1. The length of the two lines AB and AD.   **(8 Marks)**

2. The gradient of line BD.   **(6 Marks)**

The third question (16 Marks):

The following observations were taken in a surveying work as follows:

Line	Length (m)	Bearing
AB	115	0°52' 00'
BC	160	
CD	250	270 30'

Point E is selected 95 m from station A on line AB and point F is selected 230 m from station C on line CD. Design a complete table and find the length and bearing of line EF which could not be directly measured.

Please turn over

The fourth question (24 Marks):

The following readings were obtained in a leveling job for constructing a tunnel:
1.75, 2.20, 2.85, 0.15, (0.35), (0.65), (0.70), (0.45), 0.95, 2.75, 0.75, 0.20, 1.95, 1.80, 2.1, 0.75, 2.00, 3.55, 0.10 and 2.90 m. The level was changed after the second, fourth, sixth, seventh and ninth points. The second, fifth, sixth and tenth readings were taken on the ceiling of the tunnel. The readings between brackets were soundings on the floor of the tunnel. Put your results in full table and it is required to:

1- Find the reduced levels of all the points if the reduced level of the sixth point was 1.25 m, check your results. (18 Marks)

2- Find the reduced levels of all the soundings if the reduced level of the eighth point was the water surface in tunnel. (6 Marks)

The fifth question (16 Marks):

The following reads were taken when constructing a new road:

Chainage (m)	0.00	200.00	400.00	600.00	800.00
Reduced level (m)	17.40	19.50	18.30	19.20	20.00

The width of the new road 10.0 m, the right side slope was 3 horizontal and 2 vertical and the left side slope was 2 horizontal and 1 vertical. The reduced level of the point of chainage 200.00 m was 20.00 m and the uniform slope of the road was 0.50% to the down. It is required to:

1- Compute the volume of cut or fill. (12 Marks)

2- Draw the longitudinal section with 1:5000 horizontally and 1:50 vertically. (4 Marks)

The sixth question (14 Marks):

Two roads intersect at intersection angle of $150°$, the chainage of the intersected point at 1500 m and the radius of the curve is 335.885 m. Calculate all the data necessary for setting out the curve using the deflection angle method. The sub chord length=30 m .