National Exams December 2016

04-Geom-A1, Surveying

(3 hours duration)

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.

2. This is a CLOSED BOOK EXAM.
   Any non-communicating calculator is permitted.

3. FIVE (5) questions constitute a complete exam paper.
   The first five questions as they appear in the answer book will be marked.

4. Each question is of equal value.

04-Geom-A1 Surveying

Candidate Name: Signature:

Give answers to Question 1 and any four (4) of the Questions 2 to 7 (20 marks each).

1. Give true (T) or false (F) to the following 10 statements [2 marks each]. Note that you will have to make a right correction for the false statement to get 2 marks. If you make a wrong correction for the false statement, you will only get 1 mark.
   1) For a 9-sided traverse measured using a Leica TPS1205 total station unit, the allowable misclosure is ±15". [ ]
   2) The heights obtained from GPS surveys are measured with respect to the geoid. [ ]
   3) The geometric relationships among the geoid, ellipsoid, and the earth's surface can be described as that the geoidal height equals the ellipsoidal height plus the orthometric height. [ ]
   4) For the circular curves having a radius R = 900 ft, its degree of curve by chord definition is 6°21′58″. [ ]
   5) If the forward azimuth and forward bearing of the line AB are 235° and S55°W, respectively; then the back azimuth and back bearing of the line BA are 55° and N55°E, respectively. [ ]
   6) In a trigonometric leveling using a total station instrument, the survey must know the height of the instrument in order to calculate the difference in elevation between the two successive points. [ ]
   7) For a horizontal curve, the station of the point of curvature equals the station of the point of intersection minus the tangent distance, while the station of the point of tangency equals the station of the point of intersection plus the tangent distance [ ].
   8) For a vertical curve, the station of the point of vertical curvature equals the station of the point of intersection minus the length of the vertical curve, while the station of the point of vertical tangency equals the station of the point of intersection plus the length of the vertical curve. [ ]
   9) A traverse beginning and ending at the same known point is called a closed traverse, but a traverse starting at a known point and ending at another known point is called an open traverse. [ ]
   10) If the accidental error is estimated to be ± 0.006 m for each of 36 separate measurements, then the total estimated error should be ± 0.036 m [ ].

2. Given that the radius of a highway circular curve is 900 m, the angle between the

back and forward tangents is 14°45', and the station of the point of intersection is 1+948.800 m, use the arc definition to compute the length of the curve and the tangent distance, the external distance and middle ordinate for this curve and the long chord, and the stations of the point of curvature and the point of tangency.

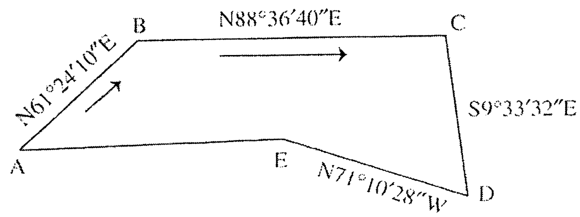
3. A -3.00% grade meets a +5.00% grade at station 62+00, where the elevation is 600.60ft. An equal-tangent parabolic curve 800 ft long has been selected to join the two tangents. Determine the station and elevation of the beginning of vertical curve, the station and elevation of the end of vertical curve, and the elevation of the first full station on the curve.

4. Given a 5-side traverse, compute the departures and latitudes, the error of closure, and precision, and balance each of the latitudes and departures.

Course	Length (m)	Azimuth	Departure	Latitude
AB	1,352.562	245°16'24"		
BC	1,999.670	147°06'37"		
CD	1,329.127	95°33'20"		
DE	2,427.328	23°45'21"		
EA	2,163.325	274°01'46"		

5. Draw a sketch with a north arrow for a vacant lot based on the given bearings and measured distances: N20°W, a distance of 294.50 m from Points A to B; S69°W, a distance of 354.50 m from Points B to C; S20°E, a distance of 294.50 m from Points C to D; and N69°E, a distance of 354.50 m from Points D to A (using a 1: 5,000 map scale).

6. Given the bearings of sides AB, BC, CD, and DE, compute the deflection angles and the interior angles at B and D.



7. The following table represents a differential leveling work. Prepare and complete the necessary filed notes in a table for this work and calculate the elevation of the point BM2 along with a page check.

Station	BS	HI	FS	Elevation (ft)
BM1	2.45			88.00
TP1	5.43		6.53	
TP2	3.18		4.91	
TP3	4.22		7.42	
BM2			6.11	