University of the State of New York.

32ND ADVANCED ACADEMIC EXAMINATION.

PLANE TRIGONOMETRY.

THURSDAY, November 22, 1888—Time, 9:30 A.M. to 12:30 P.M. only.

36 *credits, necessary to pass,* 27.

1. Explain the difference between the characteristic and mantissa of the logarithm of a whole number and that of a decimal fraction.. 4

2. The logarithm of 87 is 1.939519. Find the logarithm of the cube of 87, and state the principle employed..... 2

3. The natural sine of an arc 32° is .5299. What operation must be performed on this natural sine to compute the logarithmic sine of the same arc? Give reasons for the operation..... 2

4. Explain the principle upon which the algebraic signs of the trigonometrical functions are determined, and give the sign of the cosine in each of the four quadrants..... 4

5. Draw a diagram showing the relations between the tangent of an arc and its sine and cosine, and deduce the equation showing the value of the tangent 3

6. In a circle whose radius is 50 feet find the following: cosine of 45°; tangent of 30°... 3

7. Prove that $\sin(a-b) = \sin a \cos b - \cos a \sin b$..... 4

8. Assuming the values of the functions of the sum and of the difference of two arcs, prove that:

(1) $\sin 2a = 2 \sin a \cos a$ and show why your process is correct. 2

(2) $\cos p + \cos q = 2 \cos \frac{1}{2}(p+q) \cos \frac{1}{2}(p-q)$ 2

9. Prove that in any right-angled triangle the perpendicular is equal to the base multiplied by the tangent of the angle at the base. 2

10. Prove that in any plane triangle the sum of the sides including either angle is to their difference as the tangent of half the sum of the two other angles is to the tangent of half their difference..... 4

11. In the oblique-angled triangle A B C give the formula to find a when C, B, and c are given..... 1

12. Explain by means of a diagram what measurements and what computations are necessary to determine, trigonometrically, the height of an inaccessable tower above a horizontal plane... 3