The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE TRIGONOMETRY

Thursday, June 19, 1919—1.15 to 4.15 p. m., only

Answer six questions. Papers entitled to less than 75 credits will not be accepted.

1 *a* Explain why log cos A can not exceed 0. For what other function of A is this true?

b For purposes of computation why is it an advantage to have trigonometric formulas expressed as products or quotients rather than as sums or differences?

c When the base is 10, what are the logarithms of the following: 1; 10; 10000; .1; 0.01; 0.0001?

When the base is 2, what are the logarithms of 1, 2, 4 and 256?

2 *a* When $\sin A = -\frac{1}{2}\sqrt{2}$, write the values of the cosine, tangent and cotangent for the quadrant in which tan A is negative.

b Name the four smallest positive angles for which $\sin A = -\frac{1}{2}\sqrt{2}$

3 *a* Simplify $\dfrac{\sin 75° - \sin 15°}{\sin 75° + \sin 15°}$ without making use of the tables for natural functions.

b Express the following as functions of positive angles less than 45°: cot 142.5°; $-\cos(-35.75°)$

4 Prove the following:

a $\dfrac{\cos A}{1-\tan A} + \dfrac{\sin A}{1-\cot A} = \sin A + \cos A$

b $\left(\cos\dfrac{A}{2} - \sin\dfrac{A}{2}\right)^2 = 1 - \sin A$

5 An observer in a war balloon observes the angle of depression of an enemy battery to be 27.5°; an instrument registers the height as 3250 feet. At what distance from a point on the ground directly below the observer is the battery located, if the point and the battery are on the same horizontal plane?

6 An observer in a war balloon at a definite height locates two distant forts; if the forts and the point on the ground directly below the observer are on the same horizontal plane, what further observations should be made and how should these observations be made use of to determine the distance between the forts?

7 From two points on the same level 875 feet apart, on opposite sides of a tower and directly in line with it, the angles of elevation are observed to be 29° 30′ and 21° 15′; find the height of the tower.

8 Given $a=34.16$, $b=26$, $c=16.7$; determine the size of the largest angle.

TRIGONOMETRY—*concluded*