The University of the State of New York 154

EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE TRIGONOMETRY

Thursday, September 9, 1920—9.15 a. m. to 12.15 p. m., only

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

1 If s represents one side of a regular pentagon, show that the area is $\frac{5}{4} s^2 \tan 54°$.

2 If $A = 18°$, then $\sin 3A = \sin(90 - 2A) = \cos 2A$. Expanding both sides of this equation and solving for $\sin A$, find, without using the tables, the value of $\sin 18°$ expressed as a decimal.

3 Find by the use of logarithms the value of

$$\sqrt[3]{\frac{(-.00326)^2 \times 321.38}{2.3017}}$$

4 Without the use of tables, find all possible values of A between $0°$ and $360°$ that satisfy the equation

$$2\sqrt{3}\cos^2\theta = \sin\theta$$

5 If $\tan 2x = \frac{3}{4}$, find $\tan x$ and $\sin x$ when it is known that x is an angle in the third quadrant.

6 An observer standing on the bank of a river notes that the angle subtended by a flagpole on the opposite bank is $33° 10'$; when he retires 120 feet from the bank he finds the angle to be $18° 16'$. Find the width of the river.

7 Solve the triangle ABC when $C = 104° 13' 48''$, $b = 115.72$, $c = 165.28$

8 A man in a railway car going 45 miles an hour observes the rain drops falling at an angle of $10°$ with the horizontal; assuming that the rain drops are actually falling vertically, find their speed.