Examination Department

146TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 15, 1897—9:15 a. m. to 12:15 p. m., only

100 *credits, necessary to pass,* 75

***Answer 10 questions but* no more.** *If more than 10 questions are answered only the first 10 of these answers will be considered. Division of groups is not allowed. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits.*

1 Define *root of an equation, variable quantity, indeterminate equation, logarithm, series.*

2 Prove that if the sum of a rational quantity and a quadratic surd is equal to the sum of another rational quantity and another quadratic surd (*a*) the two rational quantities are equal, (*b*) the two quadratic surds are equal.

3–4 A and B, who are 165 miles apart, set out and travel toward each other; A goes 1 mile the first day, 2 the second, 3 the third and so on; B goes 20 miles the first day, 18 the second, 16 the third and so on; how soon will they meet? Interpret both answers.

5 Prove that if the first member of the general equation of the *nth* degree is exactly divisible by $x-a$, then a is a root of the equation.

6 Derive the formulas for the *nth* term and the sum of the series of (*a*) an arithmetic progression, (*b*) a geometric progression.

7 Reduce $\dfrac{a^{\frac{1}{2}}b^{\frac{2}{3}}}{a^{\frac{1}{2}}-b^{\frac{2}{3}}}$ to an equivalent fraction having a rational denominator.

8 Resolve into partial fractions $\dfrac{13+21x+2x^2}{1-5x^2+4x^4}$

9 Find all the roots of the equation $x^3-8x^2+21x-18=0$

10 Derive a rule for transforming an equation into another whose roots are some multiple of the roots of the first equation.

11–12 State Descartes' rule of signs and show its application by finding the number of positive roots and the number of negative roots of the following equation:

$x^4+4x^3-35x^2-78x+360=0$

13 Given $y=x+3x^2+5x^3+7x^4+9x^5$, etc.; find the value of x in terms of y.

14–15 Discuss the divisibility of $x^n \pm y^n$ by $x \pm y$.