University of the State of New York

Examinations Department

115th examination

ALGEBRA

Tuesday August 15, 1893 — 2 to 5 p. m., only

100 *credits, necessary to pass,* 75

Answer any 10 *questions, but* **no more**. *If more than* 10 *questions are answered only the first* 10 *of these answers will be considered. Each complete answer will receive* 10 *credits.*

NOTE — Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it *Ans.*

1 Define *rational quantity, surd, radical, symmetric equation, pure equation.*

2 Multiply $a^{\frac{2}{3}} - 2a^{\frac{1}{3}}b^{\frac{1}{2}} + b$ by $a - 3a^{\frac{2}{3}}b^{\frac{1}{2}} + 3a^{\frac{1}{3}}b - b^{\frac{3}{2}}$ and divide the product by $a^{\frac{1}{3}} - b^{\frac{1}{2}}$, giving the work entire.

3 Find the interest on a dollars for y years, m months and d days at p per cent *per annum.*

4 Factor

$$6a^2 - 5ab - 6b^2;\quad a^2 - a - a^2b - ab;$$
$$6 + x - x^2;\quad 3x^6y + 3x^4y^3 + 3x^2y^5.$$

5 Simplify $\dfrac{1}{a-2x} - \dfrac{(a+2x)^2}{a^3-8x^3}$ and find its value when $a = 6$ and $x = 2$.

6 Solve $\begin{cases} 2ax + by = 3c \\ bx + 3ay = 5bc; \end{cases}$ $\begin{cases} \dfrac{a}{x} + \dfrac{b}{y} = 2c \\ \dfrac{1}{x} + \dfrac{2b}{y} = 7. \end{cases}$

7 Solve $x^2 + y^2 = y - xy$
$x + y = -xy - 1.$

8 Form the equation whose roots are $\dfrac{1}{a}$ and $\dfrac{2b}{3}$ and prove your work by solving the equation.

9 Expand by the binomial formula $(2a^2 + 3b^3)^5$ indicating all the work for finding the coefficients.

10 Extract the square root of the following:

$$\frac{4}{a^2} - \frac{4b}{a} + \frac{4}{ac} + b^2 - \frac{2b}{c} + \frac{1}{c^2}.$$

11 The sum of two numbers is 7 times their difference. The difference of their squares is twice their sum. Find the numbers.

12 Simplify $\sqrt{a^2x + a^4}$, $3\sqrt{\dfrac{2a+3b}{3}}$, $\sqrt{\dfrac{a}{b}} \times \sqrt{\dfrac{b}{a}}$, $2ax\sqrt{45} + ax\sqrt{20}$, $\sqrt[4]{81}$.

13 The number of linear feet in the perimeter of a rectangle exceeds by 2 the number of square feet in its surface; its length is to its width as 3 to 4. Find the length and width.

14 Find the least common multiple and greatest common divisor of $6x^2 - 4x - 2$; $9x^3 - 27x + 18$.

15 Simplify $4a\,[a - 3\,\{2b + a\,(3c - 1) - b\} + 2]$.