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University of the State of New York

Examination Department

118th examination

ALGEBRA

Wednesday, January 24, 1894—9:15 a. m. to 12:15 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. 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 *simple equation, binomial, simultaneous equations, radical quantity, surd.*

2 The area of a rectangle is 48 sq. ft; its perimeter (sum of its sides) is 32 ft; find its length and width.

3 Reduce the following to its simplest form, having a positive numerator: $\left(\frac{2a+3b}{3a-2b}-\frac{3a-2b}{2a+3b}\right)\frac{a^2}{a^2+b^2}$.

4 Multiply $x^2y^{-1}-x+y-x^{-1}y^2$ by $xy^{-1}-1+x^{-1}y$.

5 Factor each of the following quantities:

(*a*) $4a^2b^4-25x^6y^4$, (*b*) $16a^4+8a^2b^2+b^4$, (*c*) x^3-y^3, (*d*) $12a^2-5ab-3b^2$, (*e*) x^3+y^3.

6 Solve $\frac{ax}{b}+\frac{2bx}{c}=2ax-b\ (x-c)$.

7 Solve $\frac{a}{x}+\frac{b}{y}=c,\ \frac{b}{x}+\frac{a}{y}=d$.

8 Solve $3ax^2+2bx=2ac$.

9 The sum of the squares of two numbers increased by the product of the numbers is 61, and the same sum diminished by the product is 21; find the numbers.

10 Write an algebraic expression for a number whose units, tens and hundreds are respectively x, y and z.

11 Simplify the following: $3\ [2a-(3a+\{2b-\overline{c-a}\}+b)-c]$.

12 Expand by the binomial formula $\left(2a-\frac{b^2}{3}\right)^5$, and indicate all the work for finding the coefficients.

13 The numerator of a certain fraction is to its denominator as 2 to 3; if 5 be added to the numerator the ratio will be as 3 to 2; what is the fraction?

14 Find the numeric value of the following expression when $x=4$, $y=3$, $m=1$ and $n=2$: $\frac{3x^n}{ny}-2mx^{-\frac{1}{2}}y^m+2nx^{-m}y^2$.

15 Simplify the following radicals: $\sqrt{\frac{a^4b^3}{2}}$, $\sqrt[3]{40}$, $4\sqrt[4]{15\frac{1}{2}}$, $\frac{\sqrt[3]{\frac{a^2}{b}}}{\sqrt[3]{\frac{a}{b^2}}}$, $\sqrt{a^4b^2-a^2b^4}$.