Examination Department

146TH EXAMINATION

ALGEBRA

Monday, June 14, 1897—9:15 a. m. to 12:15 p. m., only

100 *credits, necessary to pass,* 75

Answer questions 1-5 and five of the others but **no more.** *If more than five of these other questions are answered only the first five 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, simultaneous equations, affected quadratic, surd, homogeneous equation.*

2 Simplify $\dfrac{1+\dfrac{a-x}{a+x}}{1-\dfrac{a-x}{a+x}} \div \dfrac{1+\dfrac{a^2-x^2}{a^2+x^2}}{1-\dfrac{a^2-x^2}{a^2+x^2}}$

3 Solve $\dfrac{a}{x}+\dfrac{b}{y}+\dfrac{c}{z}=a,\ \dfrac{b}{y}-\dfrac{c}{z}+\dfrac{a}{x}=b,\ \dfrac{a}{x}-\dfrac{b}{y}-\dfrac{c}{z}=c$

4 Simplify $(x^2+1)-[ax-\{-(-2ax+7)-a\overline{x-x^2-7}\}+2x^2]$

5 Solve $21x^2=2ax+3a^2$

6 Find the cube root of the following:

$$1-9x+39x^2-99x^3+156x^4-144x^5+64x^6$$

7 Factor the following: $16a^4-b^8,\ a^6+1,\ 16c^2-48c+35,\ b^5+c^5,\ a^4+a^2+1$

8 Expand by the binomial theorem $(a-b-c)^3$

9 Simplify $\sqrt{9x^5+18x^4y}-\sqrt{4xy^6+8y^7}$,

$$\frac{3}{x-y}\sqrt{\frac{2a}{x-y}} \div \sqrt{\frac{18a^3}{(x-y)^5}}$$

10 Find the greatest common divisor (highest common factor) of $2x^3+x^2-x-2$ and $3x^3-2x^2+x-2$

11 Solve $\sqrt{x}-\sqrt{x-8}=\dfrac{2}{\sqrt{x-8}}$

12-13 The hypotenuse of a right triangle is 20 feet and the area of the triangle is 96 square feet; determine the sides of the triangle.

14-15 A and B ran a race which lasted 5 minutes; B had a start of 20 rods, but A ran 3 rods while B was running 2 rods; A won by 30 rods. Find the length of the course and the rate of each.