

## ADVANCED ALGEBRA

Tuesday, June 13, 1905—9.15 a. m. to 12.15 p. m., only

*Answer eight questions but no more. If more than eight are answered only the first eight 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  $12\frac{1}{2}$  credits. Papers entitled to 75 or more credits will be accepted.*

1 Define compound surd, indeterminate equation, convergent, multiple roots, combinations.

2 Simplify  $(3\sqrt{-2} + \sqrt{-4})(2\sqrt{-3} - \sqrt{-2})$ ;  $\frac{\sqrt{-2} + 3\sqrt{-1}}{\sqrt{-2} - \sqrt{-1}}$

3 From 8 physicians, 6 lawyers and 5 dentists, how many different committees, each consisting of 6 physicians, 3 lawyers and 2 dentists, can be formed?

4 Find the base of a system of logarithms in which  $\log \frac{1}{2} = \bar{1}.75$ .

5 Solve as a quadratic  $2x^2 - 3x + 11 - 5\sqrt{2x^2 - 3x + 7} = 0$

6 Prove that an equation whose coefficients are integers, that of the first term being unity, can not have a rational fraction as a root.

7 Express  $m + \frac{1}{m+} \frac{1}{2m+} \frac{1}{m+} \frac{1}{2m+} \dots$  as a surd.

8 One of the roots of  $x^4 - 7x^3 + 7x^2 + 19x + 4$  is  $2 - \sqrt{5}$ ; solve the equation.

9 Prove that the square of the geometric mean of  $a$  and  $b$  is equal to the product of their arithmetic mean and their harmonic mean.

10 Revert to four terms  $y = x - 2x^2 + x^3 - 2x^4 + \dots$

11 Determine by a general method the equal roots of

$$x^4 + 4x^3 - 2x^2 - 12x + 9 = 0$$

12 Find the scale of relation and the next two terms of the following recurring series of the second order:

$$1 - 7x - 4x^2 - 25x^3 + \dots$$