Examination Department

143D EXAMINATION

PLANE TRIGONOMETRY

Thursday, March 25, 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. A, B and C represent the angles of a triangle, a, b and c the opposite sides, S the area. In a right triangle C represents the right angle and c the hypotenuse. Each complete answer will receive* 10 *credits.*

1 Define *versed sine, tangent, logarithmic cosine, complement, function of an angle.*

2 Given log sin 40°=9.808 and log tan 40°=9.924; find log ctn 40°, log cos 40°, log sec 40° and log csc 40°.

3 Express the value of each of the other functions of A in terms of cotangent A.

4 Find the value of A when $\tan^2 A + \csc^2 A = 3$.

5 Prove that any side of a triangle is equal to the second side into the cosine of the angle opposite the third side plus the third side into the cosine of the angle opposite the second side.

6 Construct a right triangle when $\cos A = \frac{3}{5}$ and $a = 9$.

7 Prove that $\cos (A-B) = \cos A \cos B + \sin A \sin B$.

8 Prove that the area of a right triangle is equal to $s\,(s-c)$ when $2\,s = a+b+c$.

9 When the altitude of the sun is 30°, the length of the shadow cast by Bunker Hill monument is 381 feet; what is the hight of the monument?

10 If the logarithm of 27 is $-\frac{3}{5}$, what is the base?

11 How many degrees are there in the angle called a *radian?* How many degrees are there in an arc whose length is equal to the diameter?

12 The angles of depression from the top of a tower 50 feet high to two points on a level with its base and in line with the tower are 45° and 30° respectively; find the distance of each point from the other and from the top of the tower.

13 If $A+B+C=180°$, prove that $\tan A + \tan B + \tan C = \tan A \tan B \tan C$.

14 If a and b represent the two diagonals of a quadrilateral and A represents the angle of the intersection of these diagonals, prove that twice the area of the quadrilateral $= ab \sin A$.

15 In an oblique triangle a, b and C are given; derive the formulas for computing A, B, c and S.