The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

SOLID GEOMETRY

Monday, September 11, 1922—1.15 to 4.15 p. m., only

Answer eight questions, including not more than four from group I. Papers entitled to less than 75 credits will not be accepted.

Group I

Answer not more than four questions from this group.

1 Prove that the intersections of two parallel planes with any third plane are parallel.

2 Prove that the sum of the angles of a spheric triangle is greater than two, and less than six, right angles.

3 Prove that the lateral area of a prism is equal to the product of a lateral edge and the perimeter of a right section of the prism.

4 Prove that the volume of any pyramid is equal to one third of the product of its base and its altitude.

5 Prove that every section of a convex cone made by a plane passing through the vertex is a triangle.

Group II

6 Prove that if a trihedral angle is isosceles, the dihedral angles opposite the equal face angles are equal.

7 At what distance from the vertex must a cone of revolution be cut by a plane parallel to the base to divide it into two equivalent solids?

8 The volume of a sphere is 288π cubic inches; the angles of a spheric triangle on this sphere are 93°, 125° and 110°. Find the number of square inches in the area of the triangle.

9 A right cylindric block of wood having a height of 12 inches and a radius of 4 inches is to be cut down to the form of a frustum of a cone of equal height. One of the bases is to remain the same but the other is to have a radius of 3 inches. How much material must be cut off?

10 Explain how to find by the aid of an 11 foot pole, compasses and ruler a point on the floor directly beneath a point on a ceiling 10 feet high.

11 Find the area of the zone of a sphere of radius R, illuminated by a lamp placed at the distance h from the nearest point on the surface of the sphere.