

177

The University of the State of New York
EXAMINATION FOR QUALIFYING CERTIFICATES

SOLID GEOMETRY

Monday, September 15, 1924 — 1.15 to 4.15 p. m., only

Answer eight questions. Irrational results may be left in the form of π and radicals unless otherwise stated. Papers entitled to less than 75 credits will not be accepted.

- 1 Prove that the acute angle which a straight line makes with its own projection upon a plane not perpendicular to the given line is the least angle it makes with any line of that plane.
- 2 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.
- 3 Prove that the sum of the sides of a convex spheric polygon is less than the circumference of a great circle.
- 4 Prove that if two angles, not in the same plane, have their sides respectively parallel and lying in the same direction, they are equal.
- 5 Find the volume of the frustum of a regular quadrangular pyramid the sides of whose bases are 8" and 14" respectively and whose slant height is 10".
- 6 Find the locus of the centers of all the spheres that can be passed through two given points.
- 7 Prove that the plane determined by the edge VA of the tetrahedron $V-ABC$ and D , the midpoint of the edge BC , divides the tetrahedron into two equal (equivalent) tetrahedrons.
- 8 The sides of a spheric triangle are 60° , 72° and 102° respectively; find in square inches the area of the polar triangle if the radius of the sphere is 8 inches.
- 9 Prove that if a line is parallel to one plane and perpendicular to another, the two planes are perpendicular to each other.
- 10 Find the ratio of the lateral areas of a right circular cone and a right circular cylinder having the same base and altitude, if the length of the radius is $\frac{3}{4}$ of the altitude.