

positions of stability of a square log of timber as its specific gravity varies from nothing to 1.

Law of pressure of gases. Fluids with densities varying according to different laws. Barometrical measurements of heights. Proof of $z = 26215 \log \frac{H}{h}$;

$z = 26215 \cdot \frac{H-h}{h}$; $z = 52430 \cdot \frac{H-h}{H+h}$. Height of the "homogeneous atmosphere."

Stresses on boilers and thin metal cylinders. Thin hollow sphere. Relation between pressure on a surface and the tensions in the directions of principal curvature. Thick hollow cylinder $t = p \frac{R^2 + r^2}{R^2 - r^2}$. Resistance of tubes to collapsing under external fluid pressure.

Flow of water through pipes. Torricelli's Theorem. Vena contracta. Fluid friction independent of the pressure, proportional to the wet surface and to the square of the velocity. Calculation of the sizes of water pipes. Open channels.

Marks—June, 400.

Notes, 100.

1ST CLASS—VOLUNTARY—TOTAL MARKS, 1,500.

SECTION S.—*Algebra and Trigonometry*. Re-examination on the former course. Probabilities (*Todhunter*) Chapter LIII to § 737 and examples 1-10. Theory of equations of all degrees. Transformation of equations to others having different roots. Solution of cubic equations by Horner's and other methods. Determinants; Factors by inspection; reduction to a lower order by addition of columns or rows or their multiples. Application to solve simple simultaneous equations, and to processes of elimination. Demoiivre's Theorem; proof only for a positive integer; some of the less difficult applications. (*Todhunter's Plane Trigonometry*). Chapter XIX § 266-7. Read over § 263 § 269-70; 72-6; 78. Exponential values of sine, cosine, tangent. Gregory's series. Calculation of π . Chapter XXI, omitting § 293 to the end of the chapter. Summation of the series in Chapter XXII § 303-4; 6-9, and others of the same nature.....Marks, 250.

SECTION T.—*Co-ordinate Geometry and Conics*. Re-examination on, and completion of the former course. Abridged Notation (*Todhunter*, Chapter IV)...Marks, 250.

SECTION U.—*Differential and Integral Calculus*. Re-examination on, and completion of the former courses. Easy examples of tracing curves. Elementary notes on the solution of differential equations. Finite differences considered with reference to summing rational algebraical series; interpolation and correction. Summing areas. Weddle's approximation.....Marks, 250.

SECTION V.—*Applied Mechanics*. (*Notes*.) Re-examination on and completion of Section P. (*Statics*.) Moments of Inertia. The ellipse of Inertia. Graphical construction of Moments and Products of Inertia. Amsler's planimeter. Internal stresses in a plane lamina. Principal stresses; direction of pure shearing stress; Ellipse of stress. Internal stress in beams; moment of resistance; general formulæ and application to beams of symmetrical section. Shearing force the differential co-efficient of the bending moment; diagram of shearing force used to determine the bending moment. Distribution of shearing stress; application to girders. Theory of fixed beams; application to a beam fixed at both ends; (1) loaded at the centre; (2) uniformly loaded. Beams on three supports; pressures on the supports; Maximum bending moment. Distribution of pressures on a plane joint; intensity assumed to be a linear function of the co-ordinates of the point; general formula for the intensity at any point; application to rectangle, circle or ellipse, rhombus, circular or elliptic annulus. To find what force should be applied at any point of a rectangular joint in order that (1) the maximum intensity should not exceed a given amount, (2) the intensity should be always be positive, *i. e.*, a pressure; application to the above simple joints.....Marks, 500.