

11. Write a concise account of the place of the Anglo-Saxon element in the English language.

PHYSICS.

N.B.—One hundred and fifty marks to count a full paper.

1. Explain what is meant by "Temperature of a body," "Quantity of heat," "Quality of heat,"

2. Describe the process of graduating a mercury thermometer, and explain why a mercury and an air thermometer that agree at 0° and at 100° , will not exactly agree at either 50° or 250° . What corrections is it necessary to apply to the readings of a mercury thermometer in order to get the true temperature?

If the co-efficient of absolute expansion of mercury be .00018, and the co-efficient of linear expansion of glass be .0000089, find the co-efficient of apparent expansion of mercury in a thermometer.

3. What is meant by the co-efficient of expansion of a gas? The co-efficients of expansion of all gases are nearly the same. How may this be accounted for? Give examples of divergence from the general rule, and account for the divergence.

4. What is meant by "latent heat?" Describe a method of determining the latent heat of vaporization of alcohol. How is latent heat explained in the dynamical theory of heat?

5. How can it be shown that radiant heat passes through dry air and some other substances without sensibly raising their temperature? In the sun's rays are both heat rays and light rays. How can the latter be completely intercepted while the former are allowed to pass?

6. "Why do the rays of the sun, after passing through a hole of any shape, triangular for instance, or even a mere straight slit, if intercepted at a certain distance, always form a circle?"

7. State the laws of reflection of light. Describe the kaleidoscope and explain its action.

Two candles are placed in front of a concave spherical mirror of one foot radius, one candle being at a distance of five inches from the mirror, the other at a distance of seven inches from it. What distance apart will the images of the candles appear to an eye situated exactly in the axis of the mirror?

8. State the laws of the refraction of light. Explain why it is that a double concave air-lens, plunged into water, produces an image like that produced in air by a double convex water-lens. (Illustrate your explanation by a diagram.)

9. Looking vertically downwards into water, it seems shallower than it really is; why is this?

A short-sighted person who is not capable of seeing anything distinctly beyond five inches, is able to see distinctly a small object distant $5\frac{1}{4}$ inches, through a pane of glass whose refractive index is $\frac{3}{2}$: find the thickness of the glass.

10. What is meant by the polarization of light, and how is it explained by the undulatory theory? What is the cause of the blue colour of a clear sky, and why is the diffused light around the north pole of the heavens polarized?

11. Briefly describe a series of experiments to prove the following laws:—

(i.) There is no electrical force within a closed electrified conductor. (Mention two exceptions to this law.)

(ii.) When a separation of electricities takes place by friction or any other means, the amounts of positive and negative electricities produced are always such that, on being reunited, they exactly neutralize each other.

(iii.) The amount of opposite electricity induced on surrounding conductors by any electrified body is equal to the body's own charge.

(iv.) If two bodies be electrified and placed at a constant distance (great compared with their dimensions), from each other, they exert on each other a force proportional to the products of the amounts of electricity they contain. This force is attractive if their electrification be opposite, repulsive if similar.