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AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1951.

MECHANICS AND HEAT.

Tuesday, June, 26th—2.30 to 4 p.m.

- (i) Not more than *four* questions may be attempted.
- (ii) Question 1 must be attempted by all candidates.

1. Answer each of the following:—

- (a) Define specific gravity.
- (b) What volume is occupied by 20 grams of water?
- (c) What is the cause of friction between surfaces?
- (d) What is meant by the moment of a force?
- (e) State Boyle's Law.
- (f) What is meant by saying that the coefficient of linear expansion of iron is 0.000012 per $^{\circ}\text{C}$.?
- (g) How much heat is given out by 100 grams of water in cooling through 20°C .?
- (h) What horse-power is required to do 132,000 ft. lb. of work in 2 minutes?

2. Describe simple experiments you would perform to find out how the time of swing of a simple pendulum is influenced by (a) the amplitude of the swing; (b) the mass of the bob; (c) the length of the pendulum. State the results you would expect to get.

[P.T.O.]

3. A plank 12 feet long, inclined so that one end is 4 feet vertically higher than the other end, is used as a lifting machine. A load of 250 lb. is drawn slowly up the plank by an effort of 100 lb. acting parallel to the plank.

Calculate (a) the work done on the load; (b) the work done by the effort; (c) the efficiency of the machine; (d) the mechanical advantage; (e) the velocity ratio.

4. State *the Principle of Moments*.

A uniform, straight bar of weight 10 lb. and length 6 feet carries a load of 25 lb. at one end and rests on a knife-edge support 27 inches from that end. What load must be placed on the other end so that the bar will balance horizontally?

5. State the numerical values of the *fixed points* on the Centigrade and Fahrenheit scales and describe, with the aid of sketches, how you would check them experimentally for an ordinary Centigrade thermometer.

6. What is meant by *latent heat*?

Fifteen grams of dry ice at 0° C. are added to 68 grams of water at 22° C. contained in a calorimeter of water—equivalent 7 grams. The resulting temperature is 5° C. Calculate the latent heat of ice.

7. Explain clearly why:—

- (a) a coal fire helps to ventilate a room;
- (b) wearing wet clothes may cause a chill;
- (c) a kettle of water "sings" when being heated;
- (d) an ordinary glass tumbler breaks when boiling water is poured into it;
- (e) water is not used in the common barometer instead of mercury.