

## AN ROINN OIDEACHAIS

## AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS  
for  
DAY VOCATIONAL COURSES, 1952.

## MECHANICS AND HEAT.

*Tuesday, June 24th—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 density.
- (b) State the Principle of the spiral spring.
- (c) Distinguish between a barometer and a thermometer.
- (d) What is meant by saying that the moment of a force about a point is 20 lb. ft. clockwise ?
- (e) Define resultant force.
- (f) What is meant by the efficiency of a machine ?
- (g) Convert the temperature  $20^{\circ}\text{C}$ . to  $^{\circ}\text{F}$ .
- (h) A metal bar 100 cms. long expands 0.12 cm. when heated through  $80^{\circ}\text{C}$ . What is the coefficient of linear expansion ?

2. Sketch and describe the common hydrometer. For what purpose is it used ? How is it used ? State and explain the principle on which its use depends.

[P.T.O.]

3. Define *specific gravity* and state *Archimedes Principle*.

A solid piece of glass weighs 40 grams in air and 24 grams in water. A hollow glass ball weighs 350 grams and has a total volume of 320 cc. Calculate (a) the specific gravity of glass; (b) the volume of the hollow part of the ball.

4. State the *Triangle of Forces*.

A and B are two points 6 ft. apart in a horizontal line. One end of a string 4 ft. long is attached to point A and one end of another string 5 ft. long is attached to point B. The free ends of the strings are joined together and from the junction a weight of 15 lb. is suspended. Find the pull or tension in each string.

5. Define *force*, *foot-pound*, *horse-power*.

Calculate the horse-power necessary (a) to raise a load of 3 tons through a height of 55 feet in 2 minutes; (b) to keep a train moving at a steady speed of 30 miles per hour on a level track against a frictional resistance of 2,000 lb.

6. Distinguish between *latent heat* and *sensible heat*.

A calorimeter of water-equivalent 5 grams contains 75 grams of water at  $10^{\circ}\text{C}$ . When 4 grams of dry steam at  $100^{\circ}\text{C}$ . are passed into it the temperature rises to  $40^{\circ}\text{C}$ . Calculate the latent heat of steam.

7. Explain clearly why :—

(a) a clock operated by a pendulum made of a brass rod goes fast in very cold weather;

(b) the mercury level at first falls a little and then rises when the bulb of a thermometer is placed in hot water;

(c) tea cannot be prepared in the normal way at high altitudes;

(d) a barometer is regarded as a "weather glass";

(e) exposed water pipes are covered in winter with straw rope or felt.