

# AN ROINN OIDEACHAIS

BRAINSE AN GHAIRMOIDEACHAIS.

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1960.

MECHANICS AND HEAT.

Wednesday, 15th June—2.30 to 4.30 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) Distinguish between density and specific gravity.
- (b) Define pressure.
- (c) What types of energy occur in a swinging pendulum ?
- (d) Name and define the unit of power.
- (e) State the relationship between the resultant and the equilibrant of a number of given forces.
- (f) For what purpose is a clinical thermometer used ?
- (g) What quantity of heat will raise the temperature of 2 lb. of water from 50°F. to 90°F. ?
- (h) An iron bar 150 cms long expands 0.144 cm. when heated through 80°C. Find the coefficient of linear expansion of iron.

2. State the *Law of Flotation* and describe how you would verify it by experiment.

Make a neat sketch of a common hydrometer. State the purpose for which it is used and how it is used.

3. Explain, with the aid of sketches, the action of a bicycle pump and the valve attached to the inner tube.

What is the resulting pressure when 1,200 cu. ins. of air at a pressure of 15 lb. per sq. inch are compressed into a space of 180 cu. ins. without change of temperature ?

[P.T.O.]

4. State the *Principle of Moments*.

A uniform beam of length 10 ft. and weight 20 lb. rests on two supports placed 1 ft. from each end. It carries loads of 25 lb. and 30 lb. respectively at distances 2 ft. and 7 ft. from one end of the beam. Find the reactions of the supports.

5. Define *efficiency*, *mechanical advantage* and *velocity ratio* of a machine. From your definitions derive the relationship between these three quantities.

In a simple wheel and axle the diameters of the wheel and axle are 36 ins. and 4.5 ins. respectively. A pull of 25 lb. is required to raise a weight of 180 lb. Find the M.A., the V.R., and the efficiency of the machine.

6. Describe, with the aid of a sketch, how you would determine the *latent heat of steam*, indicating the main precautions to be taken in the experiment.

If 5 grams of dry steam at  $100^{\circ}\text{C}$ . give out 3,000 calories of heat in condensing and cooling to  $36^{\circ}\text{C}$ ., calculate the latent heat of steam.

7. Distinguish between *conduction*, *convection* and *radiation*.

Explain, with sketch, how a hot water central heating system operates in heating a building and show how conduction, convection and radiation are concerned in the operation.