

AN ROINN OIDEACHAIS

AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS
for
DAY VOCATIONAL COURSES, 1955.

MECHANICS AND HEAT.

Tuesday, 21st June.—2.30 to 4 p.m.

- (i) Not more than *four* questions may be attempted.
 - (ii) Question 1 must be attempted by all candidates.
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1. Answer each of the following :—

- (a) For what purpose is an opisometer used ?
- (b) A bottle weighs 20 gr. when empty, 70 gr. when full of water and 60 gr. when full of oil. Find the specific gravity of the oil.
- (c) What is the volume of a body which weighs 64 gr. in air and 55 gr. in water ?
- (d) State the Parallelogram of Forces.
- (e) Define a Centigrade Heat Unit (C.H.U.).
- (f) What is a convection current ?
- (g) Define coefficient of linear expansion.
- (h) Calculate the mechanical advantage and velocity ratio of a machine in which an effort of 50 lb. acting through a distance of 15 ft. raises a load of 300 lb. through a vertical height of 2 ft.

2. State *Boyle's Law* and describe briefly, with the aid of a neat sketch, how you would verify it experimentally.

A mass of gas has a volume of 360 cc when its pressure is 30 ins. of mercury. If the temperature remains unchanged, find the pressure when its volume is 400 cc.

3. What is meant by *friction* and what causes it? Explain some of its uses and disadvantages. Give some methods used in practice for increasing and for lessening friction.

Calculate the horse-power necessary to keep a motor car moving at a steady speed of 60 miles per hour on a level road against a frictional resistance of 40 lb.

4. Define *centre of gravity*.

Determine the position of the centre of gravity of a square piece of cardboard of 6 inch edge from which a square of 2 inch edge has been removed at one corner.

5. Explain the difference between the *temperature* of a body and the *quantity of heat* in it. Make a neat sketch of a clinical thermometer and explain its action.

Convert the temperature 98.4°F . to $^{\circ}\text{C}$.

6. What is meant by the *water-equivalent* of a body?

When 96 grams of water at 41°C . were added to 75 grams of water at 8°C . contained in a calorimeter, the resulting temperature was 26°C . Calculate the water-equivalent of the calorimeter.

7. Explain clearly why :

- (a) an iron ship floats in water ;
- (b) it is easier to loosen a nut with a spanner than with the fingers ;
- (c) a dry, windy day is best for drying clothes in the open air ;
- (d) steam at 100°C . gives a more serious scald than boiling water ;
- (e) a lever balance measures the mass of a body but a spring balance measures its weight.