AN ROINN OIDEACHAIS

AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS
for
DAY VOCATIONAL COURSES, 1954.

MECHANICS AND HEAT.

Wednesday, June 23rd—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*) A brass cube of edge 2 in., weighs 2·44 lb. What is the density of brass ?

   (*b*) For what purpose is a hydrometer used ?

   (*c*) State the Triangle of Forces.

   (*d*) Distinguish between work and energy.

   (*e*) How much work is done in 3 minutes by a machine working at the rate of 2 H.P. ?

   (*f*) Why is it advised never to wash a clinical thermometer in hot water ?

   (*g*) Distinguish between a calorie and a B.Th.U.

   (*h*) How is the boiling point of water affected by changes in the atmospheric pressure ?

2. Why does a body apparently weigh less when immersed in a liquid than it does in air ?

   A piece of granite weighs 68 grams in air, 43 grams in water and 50 grams in petrol. Find :

   (*a*) the volume of the piece ;

   (*b*) the specific gravity of granite ;

   (*c*) the specific gravity of petrol.

3. When a pipette is dipped into water and some of the air is sucked out from the top, why does water rise up into the pipette ?

Make a neat sketch of a suction pump used for raising water from a well. Describe and explain its action. Why is there a limit to the depth from which it can raise water ?

4. State the Principle of Moments.

A uniform beam AB rests horizontally on two supports, one at end A and the other 1 foot in from end B. The beam is 10 ft. long, weighs 45 lb. and carries a load of 72 lb. at a point 4 ft. from end A. Calculate the reactions of the supports.

5. In a test on a machine of velocity ratio 25, the following results were obtained :—

Load raised (lb.)	100	200	500	900	1,700	2,700
Effort required (lb.) :	20	25	40	60	100	150

Find the mechanical advantage and the efficiency for each load and plot the load-efficiency graph for the machine. Read off the efficiency when a load of 1,200 lb. is raised.

6. Explain the terms *conduction*, *convection* and *radiation*, and give a practical illustration in each case.

Explain how the water-cooling system of a motor car engine works.

7. Define *specific heat*.

Pieces of aluminium, weighing altogether 48 grams and at a temperature of 100° C., are added to 50 grams of water at 11° C. contained in a calorimeter of water-equivalent 4 grams. The resulting temperature is 25° C. Find the specific heat of aluminium.