

AN ROINN OIDEACHAIS

BRAINSE AN GHAIRMOIDEACHAIS.

CERTIFICATE EXAMINATIONS for DAY VOCATIONAL COURSES, 1961.

MECHANICS AND HEAT.

Thursday, 22nd June—2.30 to 4.30 p.m.

Any four questions may be attempted.

1. (a) What is a compound bar? What happens when it is heated and why does it happen? Mention any use of the bar.
(b) A uniform plank AB, 14 feet long and weighing 50 lb., rests on a pivot 3 feet from A and is supported at B by a vertical rope. A load of 57 lb. is attached to the plank one foot from B. Find the tension in the rope and the force on the pivot.
2. (a) Define latent heat of vaporisation.
The boiling point of ether is 37°C . If some ether, which is stored at room temperature, is poured on a person's hand it has an immediate cooling effect on the hand. Explain this fully.
(b) The effective length of the handle of a screw-jack is 20 in., and the pitch of the screw thread is $\frac{1}{2}$ in. What force must be applied at the end of the handle to raise a load of 11 cwt., if the efficiency of the jack is 35 per cent?
3. (a) Explain why a hot liquid placed in a vacuum (thermos) flask will not lose heat quickly by any of the three modes of heat transfer.
(b) A solid weighs 42.5 gm. in air, 25.5 gm. in water and 28.9 gm. in oil. Calculate the specific gravity of the solid and of the oil.

[P.T.O.]

- 4. (a) What quantity of heat is required to convert 30 gm. of ice at -5°C into water at 20°C ? (Specific heat of ice = 0.5; latent heat of fusion of ice = 80 calories per gram.)
- (b) How would you demonstrate that the atmosphere exerts a pressure? Explain why a barometer may be used for the measurement of height.

5. Define work and power. State and define one unit in which each quantity is measured.

How many gallons of water will a 3 horse-power pump raise through a height of 40 feet in one hour if the efficiency is 70 per cent?

(1 gallon of water weighs 10 lb.).

- 6. (a) Why does food cook more quickly in a pressure cooker than it does in an open vessel?
- (b) Why is a snowball produced by pressing flakes of snow together?
- (c) Express a temperature of 95°F in $^{\circ}\text{C}$.
- (d) Describe the volume changes that take place when a given mass of water is cooled from 20°C till it becomes ice at 0°C .

The boiling point of water is 100°C . If some other liquid is heated at room temperature in a closed vessel it may become a liquid. Explain this. The relative length of the handle of a screw-jack is 30 in. and the pitch of the screw thread is $\frac{1}{2}$ in. What force must be applied at the end of the handle to raise a load of 11 cwt. if the efficiency of the jack is 35 per cent?

Explain why a hot liquid placed in a vacuum (thermos) flask will not lose heat quickly by any of the three modes of heat transfer.

A solid weighs 11.5 gm. in air, 35.5 gm. in water and 25.5 gm. in oil. Calculate the specific gravity of the solid and of the oil.