AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1968

APPLIED MATHEMATICS – PASS

WEDNESDAY, 26th JUNE – AFTERNOON, 2.30 to 5

Not more than <u>six</u> questions may be answered.
All questions are of equal value.
Mathematical Tables may be obtained from the Superintendent.

1. Beginning from rest, on a straight road a car weighing 10 cwt. attains a speed of 60 m.p.h. in 22 seconds. Assuming the acceleration is uniform find

(i) the acceleration;
(ii) the velocity of the car after 10 seconds;
(iii) the distance which the car travels in 22 seconds;
(iv) the momentum of the car after 22 seconds.

2. An observer on shore sees a ship A moving East and a ship B moving North East, each with a speed of 12 knots. To an observer in A with what velocity does B seem to move ? (Graphical solution accepted).

3. Distinguish between kinetic energy and potential energy. A body is released from rest at a point A on a smooth plane inclined at an angle of 30° to the horizontal. The body slides down the plane under gravity. What is its loss of vertical height after 4 seconds ?

4. Distinguish between speed and velocity.

A train travels at 30 m.p.h. round a circular curve of radius 600 yards. Find

(i) the angular velocity of the train,
(ii) the acceleration of the train along the radius of the curve.

5. Explain how you would locate the centre of gravity of (i) a rectangular lamina, (ii) a triangular lamina. What result would you expect in each case ?
From each of three corners of a square piece of cardboard of area 9 sq. in. a square of area 1 sq. in. is cut. How far from the fourth corner is the centre of gravity of the remaining piece of cardboard ?

6. A uniform ladder stands with one end resting against a smooth vertical wall, and the other end on a rough horizontal floor. When the inclination of the ladder to the vertical is 30° the ladder is just about to slip. Calculate the coefficient of friction between the ladder and the floor.

7. State the Principle of Archimedes.

A horizontal surface immersed in a liquid of specific gravity 1·03 bears a pressure of 1·01 x 10⁸ dynes per cm². due to its depth h below the liquid surface.
Calculate h to the nearest metre.

8. The diagram shows two wheels whose centres are fixed. A tight belt C passes over the wheels causing the larger wheel to rotate whenever the smaller wheel rotates, no slipping occurring between belt and wheel.

Calculate the ratio of the angular velocity and the ratio of the acceleration (along the radius) of the larger wheel to the smaller, the ratio of the diameters of the wheels being 2 to 1.
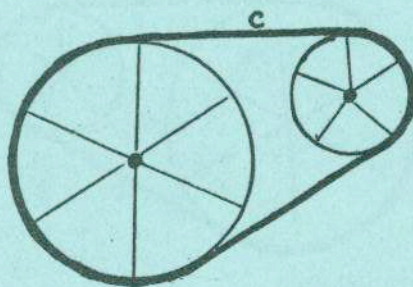
9. A car of mass 15 cwt. is travelling at 45 m.p.h. What force is necessary to bring it to rest

(i) in a distance of 55 yards ?
(ii) in 14 seconds ?