

## LEAVING CERTIFICATE EXAMINATION, 1964.

## APPLIED MATHEMATICS - PASS.

MONDAY, 15th JUNE—Morning, 10 to 12.30.

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

1. A, B, C, D are four points on a straight line such that  $AB = 10$  ft.,  $BC = 20$  ft. and  $CD = 5$  ft. A particle starting from rest at A moves with uniform acceleration from A to B, with uniform velocity from B to C, with uniform retardation from C to D and comes to rest at D. Find the total time taken by the particle to travel from A to D if it takes 1 second to travel from C to D.

2. The distances of a moving body from a fixed point at intervals of  $\frac{1}{2}$  second are shown in the following table:

Time (in seconds)	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Distance (in feet)	5	7	10	16	28	50

Draw a distance-time curve and use it to estimate

- (i) the speed of the body after the first 2 seconds of motion,
- (ii) after how many seconds the body has a speed of 28 ft. per sec.

3. To the driver of a car travelling South-West at a speed of 52 ft. per sec. the wind appears to blow directly from the West. If the wind is actually blowing from the North, find its speed.

The car keeps the same direction but reduces speed to 26 ft. per sec. Find the new apparent direction of the wind.

4. Forces of 5 and 6 lb. wt. act along the lines AO and OB, respectively, the angle AOB being  $120^\circ$ . Find the magnitude of the resultant in lb. wt. and the angle which this resultant makes with OB.

5. State the theorem of the Triangle of Forces.

Three light strings OA, OB, OC are knotted at O. The ends A and B are attached to a horizontal ceiling and C is tied to a weight of 5 lb. which hangs freely. If  $\angle OAB = 30^\circ$   $\angle OBA = 50^\circ$ , find the tensions in the strings OA and OB.

6. A triangular portion ABE is cut out of a square lamina ABCD. If  $AB = 12$  inches and  $AE = BE = 10$  inches, find the position of the centre of gravity of the remainder.

7. A wheel turns about its hub (centre) at the rate of 120 revolutions per minute. Calculate its angular velocity in radians per sec. If the diameter of the wheel is 16 inches, find the linear velocity of a point on the rim in ft. per sec.

8. A train which weighs 120 tons is travelling along a level track at a constant speed against a resistance of 22 lb. wt. per ton. If the engine is working at the rate of 160 horse-power, find the constant speed.

9. The inside of a vessel is in the shape of a cube where each edge is 2 feet long. Water fills the cube to a depth of 8 inches and the remainder is occupied by oil of specific gravity 0.8. Find the thrust on the base of the vessel due to the two liquids.