AN ROINN OIDEACHAIS

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1949.

MATHEMATICS—Algebra—Pass.

TUESDAY, 14*th* *JUNE*.—Morning 10 to 12.30.

Six questions may be answered.

All questions are of equal value.

Mathematical Tables may be obtained from the Superintendent.

1. Factorise the expressions :
   (i) $x^4+x^2y^2+y^4$;
   (ii) $(a+b+c)^3-a^3-b^3-c^3$.

2. Solve the equations :
   (i) $6x^3-5x^2-2x+1=0$;
   (ii) $\left.\begin{aligned} x^3-y^3&=98 \\ x-y&=2 \end{aligned}\right\}$

3. Find the sum of n terms of the series

$$-8,\ -2,\ 4,\ 10,\ 16,\ 22,\ \ldots$$

What is the least value of n for which the sum of n terms of the series exceeds 10,000 ?

4. Express the square root of $\frac{17}{12}-\sqrt{2}$ in the form $\sqrt{x}-\sqrt{y}$.

Find the value of the expression $\sqrt{\left[\dfrac{\frac{17}{12}+\sqrt{2}}{\frac{17}{12}-\sqrt{2}}\right]}$, correct to *two* decimal places.

5. Without using the Tables, evaluate the following :—

$$\log_3 27\ ;\ \ \log_{27} 3\ ;\ \ \log_{\frac{1}{3}} 27.$$

Using the Tables, find the values of $\log_{2\cdot718} 1000$; $\log_{\sqrt{2}} \sqrt{3}$.

6. Find the nth term and the sum of n terms of the series

$$2,\ -6,\ 18,\ -54,\ \ldots$$

Insert two geometric means between 2 and -250.

7. What is an "identical equation" ?

If A, B, C, D are independent of x, what value must be assigned to each of them, so that x^3-x+5 may be identically equal to

$$A(x-2)^3+B(x-2)^2+C(x-2)+D\ ?$$

Or,

7. Factorise the expression $(b+c)(c+a)(a+b)+abc$.

8. Two roads lead from one place X to another Y, one road being 18 miles longer than the other. Three motorists A, B, C left X at the same time to travel to Y. A took the shorter road and travelled at uniform speed. B and C took the other route and travelled at speeds which exceeded that of A by 13 and 18 miles per hour, respectively. C reached Y half-an-hour sooner than B and two hours sooner than A. Find C's speed and the length of his journey.

Or,

8. Using the same axes and the same scales, draw the graphs of

(i) $y=\frac{3x+1}{x-1}$,

(ii) $7y=5x+30$.

[Special care should be given to the portion of graph (i) lying between $x=-1$ and $x=2$.]

Write down the equation in x and the equation in y whose roots are the values of x and y, respectively, at the points of intersection of the graphs, and write down from the graphs approximate values of the roots of those two equations.