AN ROINN OIDEACHAIS.

LEAVING CERTIFICATE EXAMINATION, 1962.

MATHEMATICS—Algebra—Pass.

WEDNESDAY – 13th JUNE – Morning, 10 to 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. (i) Solve the equation $x^2(x-4)^2 = 9$.

   (ii) Solve the simultaneous equations

$$4x = y^2 + 8y + 16$$
$$7y = x + y^2 + 1.$$

(25 marks.)

2. (i) Show that $(x-1)$ is a factor of $x(x-2)(x-3) - (x-3) + 4(x-2)$.

   (ii) If $(x-1)$ and $(x-4)$ are factors of $2x^3 - 9x^2 + Ax + B$, find the values of A and B and factorise the expression fully.

(25 marks.)

3. (i) The first term of an arithmetical progression is 5 and the fourth term is 23. Find the common difference and the sum of the first fifty terms.

   (ii) Find the value of n so that the sum of the first n terms of the arithmetical progression 7, 12, 17... exceeds the sum of the first n terms of the arithmetical progression 6, 10, 14... by 210.

(30 marks.)

4. (i) Express $\frac{1}{5-\sqrt{3}}$ as a fraction having a rational denominator.

   (ii) Show that $1+\sqrt{3}$ is a root of the equation $x^2(3-x) = 2$.

   What are the other roots of the equation?

(30 marks.)

5. (i) Prove the formula for the sum to n terms of a geometrical progression.

   (ii) Find the sum of the first five terms of a geometrical progression in which the first term is half the second term and the sum of the first three terms is 56.

   Show that the sum of the second five terms is 32 times the sum of the first five terms.

(30 marks.)

6. (i) If $A = \log_k 4\frac{2}{3}$, $B = \log_k 1\frac{1}{6}$ and $C = \log_k 2\frac{1}{3}$ prove $A + B = 2C$.

   (ii) If $a^x = 2$ and $\log_{10} a = \cdot 04$, find the value of x, correct to two significant figures.

(30 marks.)

7. Draw the graph of $y = (x-1)^2(x+3)$, for values of x from $-3\frac{1}{2}$ to $+2\frac{1}{2}$.

   Use the graph to solve the equation $(x-1)^2(x+3) = 1$.

   For what range of values of x is $(x-1)^2(x+3)$ positive and decreasing?

(30 marks.)