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(Department of Education).

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LEAVING CERTIFICATE EXAMINATION, 1934.

HONOURS.

MATHEMATICS
(Algebra).

MONDAY, 18*th* *JUNE*.—Afternoon, 3.30 to 6 p.m.

Six questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Solve the equations :—

   (i) $x^2 + y^2 = 13$; $xy + y^2 = 10$.

   (ii) $x - 4 = (\sqrt{x} - 2)(x - 10)$.

[40 marks.]

2. Factorise :—

   (i) $ab(x^2 - y^2) + xy(a^2 - b^2)$.

   (ii) $x^4 - 14x^2 + 48x - 35$.

[40 marks.]

3. Find the sum of n terms of the series :

   (i) $1 + 3 + 6 + 10 + \ldots$

   (ii) $1^2 + 3^2 + 5^2 + \ldots$

[40 marks.]

4. Expand $\left(x + \frac{1}{x^2}\right)^n$ by the Binomial Theorem and show that there is a term independent of x when n is any multiple of 3. Find this term when $n = 12$.

[40 marks.]

5. Trace the curve :—

$$y = (x - 1)^2 (x + 2)^2.$$

[40 marks.]

6. Show that one root of the equation $x^3 - 6x - 13 = 0$ lies between $3 \cdot 17$ and $3 \cdot 18$. Hence, or otherwise, find the value of the root correct to 3 decimal places.

[42 marks.]

7. A trader has a supply of lamps for sale. If he marks the price at five shillings each he can sell a certain number. He estimates that for every penny by which he increases the price that number will be decreased by 1%. What price should he charge for his lamps in order that he will obtain the greatest amount of money from the sales ?

[42 marks.]

8. Prove that $\frac{d}{dx} x^n = nx^{n-1}$ when n is a positive integer.

Differentiate

(i) $(x^2+1)^5$; (ii) $(\sqrt{2x}-1)^3$.

[42 marks.]

9. Find the values of

(i) $\int_0^3 (2x^3 - 9x^2 + 9x)\,dx$; (ii) $\int_0^1 (2x+1)^5\,dx$;

(iii) $\int_0^{\frac{\pi}{2}} \sin^2 x\,dx$.

Explain the result of (i) geometrically. [42 marks.]

10. Find the area enclosed by the parabolas $y^2=4x$ and $y^2+4x=8$, and find the volume generated by the revolution of this area about the axis of x.

[42 marks.]