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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1955.

MATHEMATICS—Algebra—Honours.

TUESDAY, 14th JUNE.—MORNING, 10 TO 12.30.

Not more than seven questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Solve the simultaneous equations

$$\left. \begin{aligned} x+2y &= 1-z \\ x^2+4y^2 &= 9+z^2 \\ xyz &= -6 \end{aligned} \right\}$$

[35 marks.]

2. (a) Find the sum to n terms of the series

$$2.5+5.8+8.11+\dots+(3n-1)(3n+2).$$

- (b) If the sum to n terms of a series is equal to n^3 , find the first three terms and the n th term.

[35 marks.]

3. Write down the first four terms in the binomial expansion of $(1+x)^{\frac{1}{2}}$ in ascending powers of x .

Put $x=0.24$ and use the expansion to find the value of $\sqrt[3]{2}$ correct to six places of decimals.

[35 marks.]

4. A committee of eight is to be chosen from six men and five women. How many different committees could be chosen?

- (i) In how many of the committees would there be the same number of men as of women?
- (ii) In how many of the committees would there be more men than women?
- (iii) In how many of the committees would there be more women than men?

[36 marks.]

5. Find the positive root of the equation

$$x^3 + x^2 - 5x - 3 = 0$$

correct to two places of decimals.

[36 marks.]

6. (i) Find from first principles the differential coefficient of x^3 with respect to x .

Differentiate $\sin^2 x \cos 2x$ with respect to x .

(ii) Find the points on the curve $y = \frac{x}{1-x^2}$ at which the tangent to the curve makes an angle of 45° with the x -axis.

[36 marks.]

7. A lidless rectangular box with a square base is to be made of tin. Find the least area of tin required so that the volume of the box will be 500 cubic inches.

[36 marks.]

8. Find the total area enclosed between the curve $y = x(x-1)(x-2)$ and the x -axis.

Evaluate :

(i) $\int_0^{\pi} \sin^3 \theta d\theta$;

(ii) $\int_0^1 \frac{dx}{\sqrt{4-x^2}}$

[36 marks.]