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LEAVING CERTIFICATE EXAMINATION, 1939.

PASS.
MATHEMATICS
(ALGEBRA)

MONDAY, 19*th JUNE*—AFTERNOON, 3.30 TO 6 P.M.

Seven questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Solve the equations:

(i) $\sqrt{x+16}-\sqrt{x+5}=1$,

(ii) $(b-c)x^2+(c-a)x+(a-b)=0$.

[25 marks.]

2. Express in simplest surd form the value of the expression:

$$\frac{\sqrt{11+2\sqrt{30}}+\sqrt{11-2\sqrt{30}}}{\sqrt{11+2\sqrt{30}}-\sqrt{11-2\sqrt{30}}}.$$

[25 marks.]

3. Find two integers, m and n for which

$(2\cdot5)^m=9537$, approximately,

and $\sqrt[n]{8747}=3\cdot66$, approximately.

[25 marks.]

4. A and B working together could do a certain work in x days; B and C together could do it in y days; C and A together could do it in z days. Find:

(i) how many days it would take A, B, C together to do that work;

(ii) how many days it would take A to do it.

[25 marks].

5. Find the sum of 12, $11\frac{1}{2}$, 11, $10\frac{1}{2}$ . . . to 20 terms.

What other number of terms of the series will have the same sum?

[25 marks.]

6. Solve the simultaneous equations

$$\left.\begin{array}{r}\dfrac{3x+5y}{5x+3y}=\dfrac{15}{17}\\(2x+5)(2y+7)=100\end{array}\right\}$$

[30 marks.]

7. (i) Factorise $x^4-11x^2y^2+y^4$;

(ii) Prove that the expression $(a+b+c)^3-2(a+b+c)(a^2+b^2+c^2)-8abc$ is divisible by $(b+c-a)$ and find all the other factors of the expression.

[30 marks.]

8. (i) Prove that the sum of n terms of the series $a, ar, ar^2, ar^3, ar^4, \ldots$ is $\dfrac{a(r^n-1)}{r-1}$.

(ii) Find, in simplest form, the sum of n terms of the series $(a+b)$, (a^3+b^3), (a^5+b^5), $(a^7+b^7)+\ldots$

[30 marks.]

9. If α, β represent the roots of the equation $ax^2+bx+c=0$, prove that $-\alpha$, $-\beta$ represent the roots of the equation $ax^2-bx+c=0$.

Find in simplest form in terms of x, a, b, c, the two equations whose roots are (i) $\dfrac{1}{\alpha}$, $\dfrac{1}{\beta}$; (ii) $(\alpha-3)$, $(\beta-3)$ respectively.

[30 marks.]

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

$$\text{(i) } \frac{1}{x+1}\text{; (ii) } (x-1)(x+2)$$

from $x=-4$ to $x=3$.

From your graphs find *one* root of the equation $(x^2-1)(x+2)=1$, correct to one decimal place.

[30 marks.]