INTERMEDIATE   CERTIFICATE   EXAMINATION,   1976

MATHEMATICS - LOWER COURSE - PAPER II (150 marks)

MONDAY, 14 JUNE - MORNING, 9.30 to 12

Examination Number

SECTION A (45 marks)

Attempt <u>all</u> questions.   You should not spend more than <u>45 minutes</u> on this section.
Answer each question by writing either (a), (b), (c), (d) in the box under each question number.
If you wish to change an answer, cross out your first choice and write your new answer near the box.
Mathematics tables may be obtained from the Superintendent.
This paper <u>must</u> be enclosed in your answer book.

1.   One of the following is a prime number.   Which one ?

   (a) 125   (b) 644   (c) 999   (d) 59

2. $42_{six} + 14_{six}$ is equal to

   (a) 100_{six} (b) 56_{six} (c) 4214_{six} (d) 56_{twelve}

3. $2·2 \times 10^4$ can be written as

   (a) 8·8   (b) 2 2000   (c) 880   (d) 2200

4.   The simple interest on £500 for 4 years at $7\frac{1}{2}$ % per annum is

   (a) £150   (b) £37·50   (c) £7·50   (d) £30

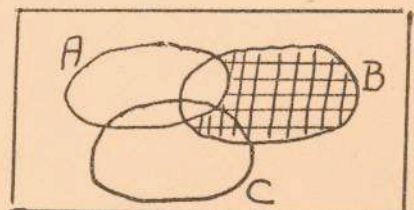5.   The mode of the data 2, 2, 3, 3, 4, 4, 3, 3, 6, 7 is

   (a) 37   (b) 3   (c) 3·7   (d) 7

6.   The nth term of a sequence is $\sqrt{n + 1}$.   Then the 24th term is

   (a) 5   (b) 25   (c) 12·5   (d) 4·9

7.   The cross-shaded region in the Venn diagram represents one
     of the following.   Which one ?

   (a) $B\backslash(A \cup C)$ (b) $B \cap C'$

   (c) $B\backslash A$ (d) $(B \cap C) \cup B.$

8. One of the factors of $2x^2 - xy + 2x - y$ is $2x - y$. The other factor is

(a) $2x^2 - xy$ (b) $2x + y$ (c) $x + 1$ (d) $x - 1$

9. $\log_{10} 1000$ is equal to

(a) 3   (b) 2   (c) 1   (d) O

10. Given the function $f : x \rightarrow 2^x$. If the domain is $\{1, 2, 3\}$, then the range is

(a) $\{3, 4, 5\}$ (b) $\{2, 4, 6\}$ (c) $\{0.5, 1, 1.5\}$ (d) $\{2, 4, 8\}$

11. Paul is now x years of age and his father is 7 times older than him. Five years from now their ages will be in the ratio 1 : 4. Which one of the following is a true statement ?

(a) $7x + 5 = \frac{1}{4}(x + 5)$ (b) $4(x + 5) = 7x$

(c) $x = \frac{1}{7}(x + 5)$ (d) $x + 5 = \frac{1}{4}(7x + 5)$

12. $5(x - 7) - 3(x - 7) - x + 7$ is equal to

(a) $3(x - 7)$ (b) $2(x - 7)$ (c) $x - 7$ (d) $2x - 49$

13. When $x \neq 0$, $\dfrac{10x^2 - 10x}{5x}$ is

(a) $2x - 2$ (b) $- 8x$ (c) $10x^2 - 2$ (d) $2x - 1$

14. The solution set of $\frac{1}{4}x - 2 = 0$ is

(a) $\{\frac{1}{2}\}$ (b) $\{2\}$ (c) $\{4\}$ (d) $\{8\}$

15. $3x - 1 < 3 - x \Rightarrow$

(a) $x < 2$ (b) $2 < x$ (c) $1 > x$ (d) $1 + 2x > 0$

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11. Paul is now x years of age and his father is 7 times older than him. Five years from now their ages will be in the ratio $1 : 4$. Which one of the following is a true statement ?

(a) $7x + 5 = \frac{1}{4}(x + 5)$ (b) $4(x + 5) = 7x$

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AN ROINN OIDEACHAIS   M.46

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SECTION B (105 marks)

Attempt **QUESTION 1** and **THREE** other questions

1. (a) Find the compound interest on £2500 for three years at 6% per annum.

   (b) A housewife bought a freezer costing £190 and paid £15·50 to have it installed.   She bought 100 kg of beef at $62\frac{1}{2}$p per kg, 30 kg of bacon at $87\frac{1}{2}$p per kg, and 100 kg of carrots at £1·50 per 10 kg.   Find the total amount that she paid.

   (25 marks)

2. (a) Find the solution set of the quadratic equation

   $$x(3x + 7) = 4(3x + 7)$$

   (b) Find the couple (x, y) that satisfies the simultaneous equations

   $$x + y = 7$$
   $$2x - y = -4$$

   Illustrate the equations and the couple by drawing a graph.

   (20 marks)

3. (a) Factorise $x^2 - y^2 - x + y$

   (b) Express as a single fraction $\frac{2}{x-1} - \frac{2}{x+1}$

   If $k = \frac{2}{x-1} - \frac{2}{x+1}$, express $\frac{4}{k} + 1$ in terms of x.

   (20 marks)

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4. In a class of 30 students 20 play basket-ball and 15 play tennis.
If all the children play one or both games, how many play both games ?
    If on the other hand, 5 children play neither basket-ball nor
tennis, how many then play both games ?

(20 marks)

5. Find the range of the function $x \to 2 - 4x + x^2$ whose domain is
$\{x \mid -1 \leqslant x \leqslant 5, x \epsilon Z \}$.
    Graph the function $f : x \to 2 - 4x + x^2$ in the domain $-1 \leqslant x \leqslant 5$,
where $x \epsilon R$.
    Use your graph to find:-

    (i) the two values of x for which $f(x) = 3$

    (ii) the value of $f(x)$ which corresponds to only one value of x.

(25 marks)

6. (a) Using the Tables, (page 20 to page 27) or otherwise, find
        correct to two significant figures the value of

$$\frac{1}{3}\left(\sqrt{2p} + \frac{1}{p^2} \right) \text{ for } p = 3.9.$$

   (b) If $0 \leqslant x \leqslant 2$ and $x \epsilon R$, plot on the number line the solution set
       of $2 - x \leqslant 3 - 2x$.

(25 marks)

7. During a school outing a class of students spent, on average
(mean), 27p per student. The amounts spent by some of the students
are given in this table:

Amount in pence spent	20	25	30	35	40
Number of students	10	6	8	4	?

Calculate the number of students in the class.

(30 marks)