FORM TP 2006259



TEST CODE 02134032

MAY/JUNE 2006

CARIBBEAN EXAMINATIONS COUNCIL ADVANCED PROFICIENCY EXAMINATION

PURE MATHEMATICS

UNIT 1 - PAPER 03/B

 $1\frac{l_2^1 hours}{19 \text{ MAY 2006 (p.m.)}}$

This examination paper consists of THREE sections: Module 1, Module 2, and Module 3.

Each section consists of 1 question. The maximum mark for each section is 20. The maximum mark for this examination is 60. This examination paper consists of 4 pages.

INSTRUCTIONS TO CANDIDATES

1. DO NOT open this examination paper until instructed to do so.

2. Answer ALL questions from the THREE sections.

3. Unless otherwise stated in the question, any numerical answer that is not exact **MUST** be written correct to three significant figures.

Examination materials

Mathematical formulae and tables Electronic calculator Graph paper

Section A (Module 1)

Answer this question.

1. (a) Solve, for x, the equations

- (i) |x+4| = |2x-1| [7 marks] (ii) $\frac{3^{x^2}}{81} = 9^{x+2}$. [7 marks]
- (b) A coach of an athletic club has five athletes, u, v, w, x and y, in his training camp. He makes an assignment, f, of athletes u, v, x and y to physical activities 1, 2, 3 and 4 according to the diagram below in which $A = \{u, v, w, x, y\}, B = \{1, 2, 3, 4\}$ and $f = \{(u, 1), (v, 1), (v, 3), (x, 2), (y, 4)\}.$



(i) State ONE reason why the assignment f from A to B is not a function.

[1 mark]

Each so:

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- (ii) State TWO changes that the coach would need to make so that the assignment, f, becomes a function $g: A \rightarrow B$. [2 marks]
- (iii) Express the function $g: A \rightarrow B$ in (ii) above as a set of ordered pairs.

[3 marks]

Total 20 marks

- 2 -

Section B (Module 2)

- 3 -

Answer this question.

(a) In an experiment, the live weight, w grams, of a hen was found to be a linear function, f, of the number of days, d, after the hen was placed on a special diet, where $0 \le d \le 50$. At the beginning of the experiment, the hen weighed 500 grams and 25 days later it weighed 1 500 grams.

(i) Copy and complete the table below.

| d (days) | | 25 |
|----------|-----|----|
| w (gms) | 500 | |

(ii) Determine

a) the linear function, f, such that f(d) = w [3 marks]

b) the expected weight of a hen 10 days after the diet began.

[2 marks]

[1 mark]

(iii) After how many days is the hen expected to weigh 2 180 grams? [2 marks]

(b) (i) Show that
$$(\tan \theta - \sec \theta)^2 \equiv \frac{\sin^2 \theta - 2\sin \theta + 1}{\cos^2 \theta}$$
. [3 marks]

(ii) Hence show that
$$\frac{1 - \sin \theta}{1 + \sin \theta} \equiv (\tan \theta - \sec \theta)^2$$
. [4 marks]

(c) Given the complex number
$$z = \frac{\sqrt{3}}{2} + \frac{1}{2}i$$
, find

- (i) |z| [1 mark]
- (ii) arg (z) [2 marks]
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Total 20 marks

[2 marks]

(iii)

2.

Section C (Module 3)

Answer this question.

3.

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(ii)

(a) (i) By expressing
$$x - 4$$
 as $(\sqrt{x} + 2)$, $(\sqrt{x} - 2)$, find $\lim_{x \to 4} \frac{\sqrt{x} - 2}{x - 4}$. [3 marks]
(ii) Hence, find $\lim_{x \to 4} \frac{\sqrt{x} - 2}{x^2 - 5x + 4}$. [3 marks]
(b) Given that $\int_2^5 f(x) dx = 10$, find $\int_2^3 [f(x) + 4] dx + \int_3^5 f(x) dx$. [7 marks]
(c) A bowl is formed by rotating the area between the curves $y = x^2$ and $y = x^2 - 1$ for $x \ge 0$
and $0 \le y \le 1$ through 2π radians around the y-axis. Calculate
(i) the capacity of the bowl, that is, the amount of liquid it can hold [3 marks]

the volume of material in the bowl. [4 marks]

Total 20 marks

END OF TEST