# MATHEMATICS

## SUBJECT 9164

**PAPER 1**

## GENERAL COMMENTS

The paper was quite standard, covering most parts of the syllabus. Candidates must manage time in answering the questions since many could not finish the paper. Some last questions were not attempted by many candidates and these being questions with most marks on the question paper means that the total marks were low for such candidates.

Candidates are reminded of the importance of rounding their answers to the required degree of accuracy if marks are not to be lost unnecessarily. For example, some marks were lost in answering 9(c) and 14 (iii) for this reason.

## SPECIFIC COMMENTS ON QUESTIONS

## QUESTION 1

Most candidates could not formulate the correct quadratic equation in $log_a^b$, due to the mistake of writing $(log_b^a)$ $(log_a^b)$ as log $(log_c^{b2})$. Some could not discard $b = a$ as not required. Hence very few marks were scored in this question by most candidates.

**Answer:** $b = a^2$

## QUESTION 2

Unnecessarily long calculations were done in answering 2(a). This naturally would reduce the time needed for answering other questions. Most candidates were able to answer the whole question correctly.

**Answer:**    2(a)    $x^4 - 16x^2 - 9x + 10$
2(b)    $-1 < x < \frac{5}{2}$

## QUESTION 3

Most candidates were able to answer this question correctly. A few had errors in reducing $i^2$ to -1.

**Answer:** $\frac{7}{25} - \frac{1}{25}i$ and $\frac{1}{5}\sqrt{2}$

## QUESTION 4

Some candidates had difficulty in writing the basic equation $\frac{n}{2}(-10 + 25) > 300$, which led to $n = 41$. In answering part (b) some candidates were not able to come up with the correct value of n when applying the equation $Tn = -10 + nd$. However, some very good complete answers were seen.

**Answer**     (a)    n = 41      (b)    d $= \frac{35}{39}$

## QUESTION 5

The first part to this question was easy to most candidates, but finding the position vector of the point P proved to be difficult for many.

**Answer:** $-\frac{8}{5}i + 2j + \frac{6}{5}k$

## QUESTION 6

Handling the algebraic steps leading to $10x = \left(\frac{k-1}{k-1}\right)^{\frac{1}{2}}$ was not easy for many candidates. Some had a poor knowledge of the laws of logarithms, and candidates must not work from the given answers.

## QUESTION 7

Part (a) and (b) were answered well by most of the candidates. In part (c) most candidates did not show the working required despite the fact that the emphasis of "calculate" was there in the question.

**Answer**     (a)     mirror line or reflection line.
                      (b)     A (3,0);       B (-1½, 0)
                      (c)     (-3, -3)

## QUESTION 8

A number of candidates could not bring out the correct substitution of $dx$ in answering 8 (a), so that nearly all the marks were lost in this part. However, some very good answers were seen. Integration by pars did not work out correctly, mostly. In part (b) some candidates went wrong by trying t expand cos $3y$ to make it be in terms of cos $y$.

**Answer**:     (a)    $\frac{2}{3}$     (b)    45°; 75°; 165°; 195°

**QUESTION 9**

A variety of correct appropriate graphs were seen some sketched $y=x^3$ and $y=3x + 3c$; some had $y = x3 + 3x$ and $y = 3$ and yet other had $y = -x3$ and $y = 3x - 3$, etc.

Part (b) was done well by nearly all the candidates who attempted it.

Candidates did not round as expected in some cases.  For example some thought that -0,81 was the answer instead of 0,810, and they lost marks.

**QUESTION 10**

Part (i) was well done by nearly all.

In part (ii) most candidates could not write the correct inequality equation.

Part (iii) had a wrong circle poorly sketched and a good number of candidates could not find the critical values which could lead to the correct range of values in part (iv).

**QUESTION 11**

Part (i) was done well by most of the candidature and a few cases of wrong differentiation were seen here and there.

In part (ii) a number of candidates could not deduce that $t = \neq -\frac{3}{2}$ and some could not even come up with the correct result of $t = 0$.  Hence the correct turning point was very rare.

**QUESTION 12**

In part (a) correct application of the factor theorem was done successfully most of the time.

In part (b) candidates were able to find the other quadratic factor and hence were able to find the other roots.

**<u>Answer:</u>**       (a)      $a = -4; b = -1$ (b)      $x = 3 \text{ or } 1.$

## QUESTION 13

In part (a) candidates were able to apply the cosine rule correctly. But some lost the final mark when they failed or neglected to round off to the nearest 0.1°. Once part (a) was obtained correctly, part (b) almost came out correctly as well by applying the cosine rule, but some failed to recall that $cos\left(\frac{\pi}{2} - x\right) = sin\ x$ and that $sin\ x \approx x$ when $x$ is small and is in radians.

Generally, full marks were scored by very few.

**Answer:**    A = 22,9°

## QUESTION 14

In part (i) some candidates worked out from the given answer by multiplying the factors. This is not generally recommended. Those who knew the correct form of the partial fractions were successful in answering part (ii) most of the time.

Some poor integration techniques were seen in part (iii) and rounding as required was neglected by some.

## QUESTION 15

Part (a) (i) was not done well by many candidates. Those who tried to compare coefficients had $ax^2$ instead of $a^2x^2$ in their expansion of $(ax + b)^2$, and this naturally led to wrong results.

In part (ii) some candidates did not correctly work out the equation $8 = 12x - 4x^2$ in order to find the correct value of $x$.

In part (iii) very few candidates were able to sketch out the correct region.

Part (iv) had a wrong form of the volume equation given. Hence little was obtained in this part by most of the candidates.

**Answers:**    (i)    9 – (2x-3)2        (ii)    y = 4x + 4        (iv)    $\frac{152}{15}\pi$

## QUESTION 16

In pert (a) (i) most candidates were not able to make the correct connections of the chain rule. Hence derivation of the differential equation was achieved by very few.

In part (a) (ii), many candidates were able to separate the variables and obtain the initial part of the general solution correctly. Some were not able to make $h$ the subject by failing to exponentiate correctly. Some were not able to deduce the maximum value of $h$.

In (b), most candidates were not able to go beyond the general solution since they were not sure about how to apply the initial conditions.