

## ADDITIONAL MATHEMATICS

### SUBJECT 4034

#### PAPER 1

#### GENERAL COMMENT

Generally the paper was fairly done by half of the candidates who attempted it. Most of the candidates performed well in Section A of the paper except a few questions like question 3, 9(b) were problematic. In Section B most candidates obtained more than half marks for the questions they attempted. Question 11(b), 12(a) and 14 were difficult for the majority of the candidates.

#### COMMENTS ON INDIVIDUAL QUESTIONS

##### QUESTION 1

This question was done very well by the majority of the candidates. They were able to calculate the coordinates by solving the simultaneous equations.

Answer:

$x$	$-\frac{2}{5}$	2
$Y$	$-\frac{2^4}{5}$	2

##### QUESTION 2

The proof of the identity was done partially well by the candidates. Some of the candidates had forgotten other compound angle identities and Pythagorean identities to use to prove  $\text{Cot}^2\theta - \text{Cos}^2\theta = \text{Cot}^2\theta \text{Cos}^2\theta$ .

##### QUESTION 3

This question was partially done well by a few students. Majority of the candidates had problems in finding the perimeter of the shaded part which helped to find the shaded part which helped to find the value of  $\theta$ . This affected the value of the shaded area.

Answers: (i)  $\theta = \frac{1}{2}$  (ii) Area =  $8\text{m}^2$

##### QUESTION 4

Most candidates got this question correctly. They were able to use binomial expansion to expand in ascending powers of  $x$ . However, those few candidates who got it wrong had forgotten to factor out 25.

Answer:  $32 - 80x + 80x^2 + \dots$

**QUESTION 5**

On this question, most candidates managed to find the vector  $\overrightarrow{CD}$ , but a few failed to realize that they were supposed to find the position vector of  $\overrightarrow{OD}$  and then find  $|\overrightarrow{CD}|$ .

Answers: (i)  $\overrightarrow{CD} = -5i + 12j$   
(ii)  $|\overrightarrow{CD}| = 13$

**QUESTION 6**

This question was done very well and candidates were able to find the common ratio and the first term. Almost 75% of the candidates got correct answers. Part (ii) of the question was done well while those who got the answers wrong made arithmetic errors.

Answers: (i)  $r = -2$  (ii)  $S_{11} = -512,25$   
 $a = \frac{-3}{4}$

**QUESTION 7**

This question was done well by a few candidates. Most of the candidates only managed part (a) only. Also, candidates failed to recall that  $\frac{ds}{dt} = V$  and  $\frac{dv}{dt} = a$ .

Answers: (a)  $V = \frac{ds}{dt} = 3t^2 - 24t + 36$   
(b) at  $V = 0$ ,  
 $t = 2, \text{ or } t = 6$   
Acceleration =  $a = \frac{dv}{dt} = 6t - 24$   
at  $t=0$ ,  $a = -12\text{m/s}^2$

**QUESTION 8**

This question was attempted partially well. Most candidates failed to recall that for equal roots  $b^2 - 4a = 0$ . Also on part (b) of the question, most candidates found correctly the critical values but failed to give the correct ranges of values of the inequality.

Answers: (a)  $K = 0$  or  $k = 8$  (b)  $x < -\frac{1}{2}$  U  $x > 5$

**QUESTION 9**

This question was performed badly by most candidates. In part (b) candidates had problems in applying implicit differentiation to find gradient of tangent and normals. This affected their equations of tangent and normals.

Answers:

(a) (i)  $x \cos x + \sin x$  (ii)  $-e^{2-x}$  (iii)  $2 \tan x \sec^2 x$

(b)  $y = 2x - 1$

### QUESTION 10

This question was very popular to most of the candidates. Majority of the candidates attempted it but a few managed to score all the marks. Most candidates had problems on question 10(a)(ii). They failed to correctly arrange the equation to find the value of  $fg(3)$ . On part (b) most candidates had the tendency of squaring only one side.

Answers: (a) (i)  $a = -5$   $b = -2$   
 (ii)  $fg(x) = 4x - 9$   
 $fg(3) = 12 - 9 = 3$

(b)  $|2x - 3| = 3x$   
 $x = \frac{3}{5}$  or  $x = 3$

### QUESTION 11

On this question, most candidates had problems on finding the value of  $a$  when the area of the region enclosed by the curve  $y = \frac{12}{x^2}$  is 3,6 units<sup>2</sup>. Also candidates, majority of them had problems on finding the volume of revolution. Very few candidates managed to get the correct volume.

Answers: (a) (i) 8 Units<sup>2</sup>  
 (ii)  $a = 5$

(b) Volume =  $\frac{128\pi}{3}$

### QUESTION 12

This was also the most popular question. Majority of the candidates who attempted this question failed to correctly express  $3\sin\theta - \cos\theta$  in the form  $r\sin(\theta - \alpha)$ . This affected their solutions on the equation. Most candidates were able to expand  $\cos(2A + 2A)$  to obtain  $\cos 4A = 1 - 8\sin^2 A + 8\sin^4 A$ .

Answer: (a) (i)  $R = \sqrt{10}$   $\alpha = 18,4^\circ$   
 $= 3\sin\theta - \cos\theta = \sqrt{10} \sin(\theta - 18,4^\circ)$

(ii)  $\theta = 57,6^\circ$  or  $159,2^\circ$

**QUESTION 13**

Work on parametric equations was done very well and most candidates were able to find  $\frac{dy}{dx}$ . They also managed to show that the normal passes through the origin. Part (ii) of the question was well done, but most candidates failed to obtain the correct values of  $t$  for which  $y+3x+37=0$  intersect the curve.

Answers: (i)  $\frac{dy}{dx} = \frac{6t}{3t^2-2} =$  where  $t = 2, \frac{dy}{dx} = \frac{6}{5}$   
 Equation of normal  $y = \frac{5}{6}x$   
 (ii)  $t = 0$  or  $t = -2$

**QUESTION 14**

This question was attempted by a few candidates; of these only a quarter managed to get it correct. Most candidates failed to produce an appropriate straight line graph for the experimental values given. This affected their values of  $k$  and  $n$ , and the estimate value of  $x$  where  $y = 2,5$ .

Answers: (i) straight line graph  $\ln y = n \ln x + \ln k$   
 (ii)  $k = e^{0,36} = 1,433 \pm 0,5$   
 Gradient  $n = 0,55 \pm 0,5$   
 (iv) When  $y = 2,5, x = 2,75$

**QUESTION 15**

On this question in part (a), most candidates attempted it. The majority of the candidates managed to obtain the correct answers. Those who failed had problems in determining the factors of the polynomial  $2x^2 - 9x^2 + 11x - 2 = 0$ . In part (b), majority of the candidates had problems in finding A, B, C using identities.

Answer: (a)  $x = 0,22$  or  $x = 2,28$  or  $x = 2$   
 (b)  $A = 2, B = 5, C = 10$