3.3 Further Trigonometric Equations

Question Paper

Course	CIE AS Maths
Section	3. Trigonometry
Topic	3.3 Further Trigonometric Equations
Difficulty	Very Hard

Time allowed: 50

Score: /41

Percentage: /100

Question 1

Solve the equation $\sin^3 3\theta - \sin 3\theta \cos^2 3\theta = 0$ for $0° \leq \theta < 180°$.

[4 marks]

Question 2

Given that

$$\cos(A° - B°) = -\frac{\sqrt{3}}{2} \text{ and } \tan\left(\frac{1}{2}A° - B°\right) = \sqrt{3}$$

and that

$$0 \leq 2B° < A° \leq 360°$$

find the possible values of A and B.

[4 marks]

Question 3a

(a) Solve the equation $5\sin\theta + 2\cos\theta = 3$, for $-\pi \leq \theta \leq \pi$.
Give your answers to three significant figures.

[4 marks]

Question 3b

(b) Write down the maximum value of $5\sin\theta + 2\cos\theta$ and the second positive value of θ for which it occurs. Give your value of θ to three significant figures.

[2 marks]

Question 4

Solve the equation

$$3\sec^4\theta + 16 = 16 + 16\tan^2\theta\,,\ -\pi \leq \theta \leq \pi$$

giving your answers to three significant figures where appropriate.

[4 marks]

Question 5

Solve the equation

$$\operatorname{cosec}^2 x - 2\frac{\operatorname{cosec} x}{\sec x} = 9 \qquad 0 \leq x \leq 2\pi$$

Give your answers to three significant figures.

[5 marks]

Question 6

Solve the equation

$$8\sin^4 2\theta = 2 - 5\cos 4\theta \qquad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$

State your answers as multiples of π.

[5 marks]

Question 7

The number of real solutions to the equation

$$|\sec x - 2| = k, \qquad -2\pi \leq x \leq 2\pi$$

is determined by the value of the constant k.

Find the number of real solutions for all values of k, given that $k \in \mathbb{R}$.

[5 marks]

Question 8a

(a) Given that $x = -2$ is a root of $x^3 + 12x^2 + 44x + 48$, solve the equation by factorisation.

[4 marks]

Question 8b

(b) Solve the equation

$$\sec\theta(\sec^2\theta + 44) + 12(\tan^2\theta + 5) = 0\,, \qquad 0° \leq \theta \leq 180°$$

Give your answers to one decimal place where appropriate.

[4 marks]