

10 (a) Show that

$$\cos(A + B) + \cos(A - B) = 2 \cos A \cos B \quad (2)$$

(b) Hence show that

$$\cos P + \cos Q = 2 \cos \frac{P + Q}{2} \cos \frac{P - Q}{2} \quad (3)$$

(c) Solve, for  $0 \leq \theta \leq \frac{\pi}{2}$ , the equation

$$\cos 5\theta + \cos 7\theta = 0$$

Give each solution in terms of  $\pi$

(4)

(d) Show that

$$\cos 8x + 2 \cos 6x + \cos 4x = 4 \cos 6x \cos^2 x \quad (3)$$

(e) Use calculus to find the exact value of

$$\int_0^{\frac{\pi}{3}} \cos 6x \cos^2 x \, dx \quad (4)$$

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**(Total for Question 10 is 16 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**