

10

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

(a) Show that $\cos^2 \theta = \frac{1}{2}(\cos 2\theta + 1)$ (3)

Given that $f(\theta) = 8\cos^4 \theta + 8\sin^2 \theta - 7$

(b) show that $f(\theta) = \cos 4\theta$ (5)

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

$$16\cos^4\left(\theta - \frac{\pi}{6}\right) + 16\sin^2\left(\theta - \frac{\pi}{6}\right) - 15 = 0$$
 (4)

(d) Using calculus, find the exact value of

$$\int_0^{\frac{\pi}{2}} (8\cos^4 \theta + 8\sin^2 \theta + 2\sin 2\theta) \, d\theta$$
 (4)

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(Total for Question 10 is 16 marks)**TOTAL FOR PAPER IS 100 MARKS**