EE1030: Matrix Theory

EE24BTECH11007 - Arnav Makarand Yadnopavit

6) The number of distinct solutions of equation $\frac{5}{4}\cos^2 2x + \cos^4 x + \sin^4 x + \cos^6 x + \sin^6 x = 2$ in the interval $[0, 2\pi]$ is $(JEEAdv.2015)$
7) Let a, b, c be three non-zero real numbers such that the equation: $\sqrt{3}a\cos x + 2b\sin x = c, x \in \left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$, has two distinct real roots α and β with $\alpha+\beta = \frac{\pi}{3}$. Then, the value of $\frac{b}{a}$ is $(JEEAdv.2018)$

Section-B JEE Main/AIEEE

1) The period of $\sin^2\theta$ is (2002)
   a) π^2 b) π c) 2π d) $\pi/2$
2) The number of solution of $\tan x+\sec x = 2\cos x$ in $[0, 2\pi]$ is (2002)
   a) 2 b) 3 c) 0 d) 1
3) Which one is not periodic (2002)
   a) $|\sin 3x| + \sin^2 x$
   b) $\cos\sqrt{x} + \cos^2 x$
   c) $\cos 4x + \tan^2 x$
   d) $\cos 2x + \sin x$
4) Let α,β be such that $\pi < \alpha - \beta < 3\pi$ If $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{27}{65}$, then the value of $\cos\frac{\alpha-\beta}{2}$ (2004)
   a) $-\frac{6}{65}$
   b) $\frac{3}{\sqrt{130}}$
   c) $\frac{6}{65}$
   d) $-\frac{3}{\sqrt{130}}$
5) If $u = \sqrt{a^2\cos^2\theta + b^2\sin^2\theta} + \sqrt{a^2\sin^2\theta + b^2\cos^2\theta}$ then the difference between the maximum and minimum values of u^2 is given by (2004)
   a) $(a-b)^2$
   b) $2\sqrt{a^2+b^2}$
   c) $(a+b)^2$
   d) $2\left(a^2+b^2\right)$
6) A line makes the same angle θ, with each of the x and z axis. If the angle β, which it makes with y-axis, is such that $\sin^2\beta = 3\sin^2\theta$, then $\cos^2\theta$ equals (2004)
   a) $\frac{2}{5}$
   b) $\frac{1}{5}$
   c) $\frac{3}{5}$
   d) $\frac{2}{3}$
7) The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is (2006)
   a) 4 b) 6 c) 1 d) 2
8) If $0 < x < \pi$ and $\cos x + \sin x = \frac{1}{2}$, then $\tan x$ is . (2006)
   a) $\frac{(1-\sqrt{7})}{4}$
   b) $\frac{(4-\sqrt{7})}{3}$
   c) $-\frac{(4+\sqrt{7})}{3}$
   d) $\frac{(1+\sqrt{7})}{4}$
9) Let **A** and **B** denote the statements
   A:$\cos\alpha + \cos\beta + \cos\gamma = 0$
   B:$\sin\alpha + \sin\beta + \sin\gamma = 0$
   If $\cos(\beta-\gamma) + \cos(\gamma-\alpha) + \cos(\alpha-\beta) = -\frac{3}{2}$,then: . (2009)
   a) **A** is false and **B** is true
   b) both **A** and **B** are true
   c) both **A** and **B** are false
   d) **A** is true and **B** is false
10) Let $\cos(\alpha+\beta) = \frac{4}{5}$ and $\sin(\alpha-\beta) = \frac{5}{13}$, where $0 \le \alpha, \beta \le \frac{\pi}{4}$. Then $\tan 2\alpha =$ (2010)
    a) $\frac{56}{33}$ b) $\frac{19}{12}$ c) $\frac{20}{7}$ d) $\frac{25}{16}$
11) If A=$\sin^2 x+\cos^4 x$, Then for all real x: (2010)
    a) $\frac{13}{16} \le$A≤ 1
    b) $1 \le$A≤ 2
    c) $\frac{3}{4} \le$A$\le \frac{13}{16}$
    d) $\frac{3}{4} \le$A≤ 1
12) In a Δ**PQR**, If $3\sin\mathbf{P} + 4\cos\mathbf{Q} = 6$ and $4\sin\mathbf{Q} + 3\cos\mathbf{P} = 1$, then the angle **R** is equal to: (2012)
    a) $\frac{5\pi}{6}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{4}$ d) $\frac{3\pi}{4}$
13) **ABCD** is a trapezium such that **AB** and **CD** are parallel and **BC** $\perp$ **CD**. If $\angle$**ABD** $= \theta$, **BC**$=p$ and **CD**$=q$, then **AB** is equal to: $(JEEM2013)$

a) $\dfrac{\left(p^2+q^2\right)\sin\theta}{p\cos\theta+q\sin\theta}$

b) $\dfrac{p^2+q^2\cos\theta}{p\cos\theta+q\sin\theta}$

c) $\dfrac{p^2+q^2}{p\cos^2\theta+q\sin^2\theta}$

d) $\dfrac{\left(p^2+q^2\right)\sin\theta}{(p\cos\theta+q\sin\theta)^2}$