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 (JEE Adv. 2015)

7. Let a, b, c be three non-zero real numbers such that the equation: $\sqrt{3}acosx + 2bsinx = c, x \in \left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$, has two distinct real roots α and β with $\alpha + \beta = \frac{\pi}{3}$. Then, the value of $\frac{b}{a}$ is _____. (JEE Adv. 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 $tanx + secx = 2cosx$ in $[0, 2\pi]$ is [2002]

   (a) 2 (b) 3 (c) 0 (d) 1

3. Which one is not periodic [2002]

   (a) $|sin3x| + sin^2 x$ (b) $cos\sqrt{x} + cos^2 x$
   (c) $cos4x + tan^2 x$ (d) $cos2x + sinx$

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 $u = \sqrt{a^2cos^2\theta + b^2sin^2\theta} + \sqrt{a^2sin^2\theta + b^2cos^2\theta}$ 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) $2(a^2+b^2)$

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 $sin^2\beta = 3sin^2\theta$, 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 $2sin^2 x + 5sinx - 3 = 0$ is [2006]

   (a) 4 (b) 6 (c) 1 (d) 2

8. If $0 < x < \pi$ and $cosx + sinx = \frac{1}{2}$, then $tanx$ 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 $tan2\alpha =$ [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) $\frac{13}{16} \leq A \leq 1$ (b) $1 \leq A \leq 2$
(c) $\frac{3}{4} \leq A \leq \frac{13}{16}$ (d) $\frac{3}{4} \leq A \leq 1$

12. In a ΔPQR, If $3sinP + 4cosQ = 6$ and $4sinQ + 3cosP = 1$, 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 $\angle ADB = \theta$, $BC = p$ and $CD = q$, then AB is equal to:
[JEEM2013]

(a) $\frac{(p^2+q^2)sin\theta}{pcos\theta+qsin\theta}$ (b) $\frac{p^2+q^2cos\theta}{pcos\theta+qsin\theta}$
(c) $\frac{p^2+q^2}{pcos^2\theta+qsin^2\theta}$ (d) $\frac{(p^2+q^2)sin\theta}{(pcos\theta+qsin\theta)^2}$