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) $2(a^2+b^2)$

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 $\sin^2\beta = 3\sin^2\theta$, 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** = θ, **BC**=p and **CD**=q, then **AB** is equal to: (*JEEM*2013)

a) $\frac{(p^2+q^2)\sin\theta}{p\cos\theta+q\sin\theta}$

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

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

d) $\frac{(p^2+q^2)\sin\theta}{(p\cos\theta+q\sin\theta)^2}$