

ASSIGNMENT 1

EE24BTECH11003 - Akshara Sarma Chennubhatla

C: MCQs WITH ONE CORRECT ANSWER

20) If $\alpha + \beta = \frac{\pi}{2}$ and $\beta + \gamma = \alpha$, then $\tan \alpha$ equals (2001S)

- a) $2(\tan \beta + \tan \gamma)$ b) $\tan \beta + \tan \gamma$
c) $\tan \beta + 2 \tan \gamma$ d) $2 \tan \beta + \tan \gamma$

21) The number of integral values of k for which the equation $7 \cos x + 5 \sin x = 2k + 1$ has a solution is (2002S)

- a) 4 b) 8
c) 10 d) 12

22) Given both θ and ϕ are acute angles and $\sin \theta = \frac{1}{2}$, $\cos \phi = \frac{1}{3}$, then the value of $\theta + \phi$ belongs to (2004S)

- a) $(\frac{\pi}{3}, \frac{\pi}{2}]$ b) $(\frac{\pi}{2}, \frac{2\pi}{3}]$
c) $(\frac{2\pi}{3}, \frac{5\pi}{6}]$ d) $(\frac{5\pi}{6}, \pi]$

23) $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$ where $\alpha, \beta \in [-\pi, \pi]$. Pairs of α, β which satisfy both the equations is/are (2005S)

- a) 0 b) 1
c) 2 d) 4

24) The values of $\theta \in (0, 2\pi)$ for which $2 \sin^2 \theta - 5 \sin \theta + 2 > 0$, are (2006 - 3M, -1)

- a) $(0, \frac{\pi}{6}) \cup (\frac{5\pi}{6}, 2\pi)$ b) $(\frac{\pi}{8}, \frac{5\pi}{6})$
c) $(0, \frac{\pi}{8}) \cup (\frac{\pi}{6}, \frac{5\pi}{6})$ d) $(\frac{41\pi}{48}, \pi)$

25) Let $\theta \in (0, \frac{\pi}{4})$ and

$$t_1 = (\tan \theta)^{\tan \theta}, t_2 = (\tan \theta)^{\cot \theta}, \\ t_3 = (\cot \theta)^{\tan \theta}, t_4 = (\cot \theta)^{\cot \theta},$$

then (2006 - 3M, -1)

a) $t_1 > t_2 > t_3 > t_4$ b) $t_4 > t_3 > t_1 > t_2$

c) $t_3 > t_1 > t_2 > t_4$ d) $t_2 > t_3 > t_1 > t_4$

26) The number of solutions of the pair of equations

$$2 \sin^2 \theta - \cos 2\theta = 0$$

$$2 \cos^2 \theta - 3 \sin \theta = 0$$

in the interval $[0, 2\pi]$ is (2007 - 3Marks)

- a) zero b) one
c) two d) four

27) For $x \in (0, \pi)$, the equation $\sin x + 2 \sin 2x - \sin 3x = 3$ has (JEEAdv.2014)

- a) infinitely many solutions
b) three solutions
c) one solution
d) no solution

28) Let $S = \{x \in (-\pi, \pi) : x \neq 0, \pm \frac{\pi}{2}\}$. The sum of all distinct solutions of the equation $\sqrt{3} \sec x + \operatorname{cosec} x + 2(\tan x - \cot x) = 0$ in the set S is equal to (JEEAdv.2016)

- a) $-\frac{7\pi}{9}$ b) $-\frac{2\pi}{9}$
c) 0 d) $\frac{5\pi}{9}$

29) The value of

$$\sum_{k=1}^{13} \frac{1}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) \sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}$$

is equal to (JEEAdv.2016)

- a) $3 - \sqrt{3}$ b) $2(3 - \sqrt{3})$
c) $2(\sqrt{3} - 1)$ d) $2(2 - \sqrt{3})$

D: MCQs WITH ONE OR MORE THAN ONE CORRECT

1)

$$\left(1 + \cos \frac{\pi}{8}\right) \left(1 + \cos \frac{3\pi}{8}\right) \left(1 + \cos \frac{5\pi}{8}\right) \left(1 + \cos \frac{7\pi}{8}\right)$$

is equal to (1984 – 3Marks)

- a) $\frac{1}{2}$ b) $\cos \frac{\pi}{8}$
 c) $\frac{1}{8}$ d) $\frac{1+\sqrt{2}}{2\sqrt{2}}$

2) The expression

$$3 \left[\sin^4 \left(\frac{3\pi}{2} - \alpha \right) + \sin^4 (3\pi + \alpha) \right] - 2 \left[\sin^6 \left(\frac{\pi}{2} + \alpha \right) + \sin^6 (5\pi - \alpha) \right]$$

is equal to (1986 – 2Marks)

- a) 0 b) 1
 c) 3 d) $\sin 4\alpha + \cos 6\alpha$
 e) none of these

3) The number of all possible triplets (a_1, a_2, a_3) such that $a_1 + a_2 \cos(2x) + a_3 \sin^2(x) = 0$ for all x is (1987 – 2Marks)

- a) zero b) one
 c) three d) infinite
 e) none

4) The values of θ lying between $\theta = 0$ and $\theta = \frac{\pi}{2}$ and satisfying the equation

$$\begin{vmatrix} 1 + \sin^2 \theta & \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & 1 + \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & \cos^2 \theta & 1 + 4 \sin 4\theta \end{vmatrix} = 0$$

are (1988 – 2Marks)

- a) $\frac{7\pi}{24}$ b) $\frac{5\pi}{24}$
 c) $\frac{11\pi}{24}$ d) $\frac{\pi}{24}$

5) Let $2 \sin^2 x + 3 \sin x - 2 > 0$ and $x^2 - x - 2 < 0$ (x is measured in radians). Then x lies in the interval (1994)

- a) $\left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$ b) $\left(-1, \frac{5\pi}{6}\right)$
 c) $(-1, 2)$ d) $\left(\frac{\pi}{6}, 2\right)$