Assignment 1

EE24BTECH11002 - Agamjot Singh*

C. MCQs with One Correct Answer

5) The general solution of the trigonometric equation $\sin x + \cos x = 1$ is given by:
(1981 − 2*Marks*)
   (a) $x = 2n\pi;\ n = 0, \pm 1, \pm 2 \ldots$
   (b) $x = 2n\pi + \frac{\pi}{2};\ n = 0, \pm 1, \pm 2 \ldots$
   (c) $x = n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4};\ n = 0, \pm 1, \pm 2 \ldots$
   (d) none of these

6) The value of the expression $\sqrt{3}\ \operatorname{cosec} 20^\circ - \sec 20^\circ$ is equal to
(1988 − 2*Marks*)
   (a) 2 (b) $2\frac{\sin 20^\circ}{\sin 40^\circ}$
   (c) 4 (d) $4\frac{\sin 20^\circ}{\sin 40^\circ}$

7) The general solution of
$\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$
(1989 − 2*Marks*)
   (a) $n\pi + \frac{\pi}{8}$ (b) $\frac{n\pi}{2} + \frac{\pi}{8}$
   (c) $(-1)^n \frac{n\pi}{2} + \frac{\pi}{8}$ (d) $2n\pi + \cos^{-1} \frac{3}{2}$

8) The equation $(\cos p - 1)\, x^2 + (\cos p)\, x + \sin p = 0$ in the variable x, has real roots. Then p can take any value in the interval
(1990 − 2*Marks*)
   (a) $(0, 2\pi)$ (b) $(-\pi, 0)$
   (c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (d) $(0, \pi)$

9) Number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $(0, 2\pi)$ is
(1993 − 1*Marks*)
   (a) 0 (b) 1 (c) 2 (d) 3

10) Let $0 < x < \frac{\pi}{4}$ then $(\sec 2x - \tan 2x)$ equals
(1994)
   (a) $\tan\left(x - \frac{\pi}{4}\right)$ (b) $\tan\left(\frac{\pi}{4} - x\right)$
   (c) $\tan\left(x + \frac{\pi}{4}\right)$ (d) $\tan^2\left(x + \frac{\pi}{4}\right)$

11) Let n be a positive integer such that $\sin \frac{\pi}{2n} + \cos \frac{\pi}{2n} = \frac{\sqrt{n}}{2}$. Then
(1994)
   (a) $6 \le n \le 8$ (b) $4 < n \le 8$
   (c) $4 \le n \le 8$ (d) $4 < n < 8$

12) If ω is an imaginary cube root of unity then the value of

$\sin\left(\left(\omega^{10} + \omega^{23}\right)\pi - \frac{\pi}{4}\right)$ is
(1994)
   (a) $-\frac{\sqrt{3}}{2}$ (b) $-\frac{1}{\sqrt{2}}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

13) $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^4 + 4\left(\sin^6 x + \cos^6 x\right) =$
(1995*S*)
   (a) 11 (b) 12 (c) 13 (d) 14

14) The general values of θ satisfying the equation $2\sin^2\theta - 3\sin\theta - 2 = 0$ is
(1995*S*)
   (a) $n\pi + (-1)^n \frac{\pi}{6}$ (b) $n\pi + (-1)^n \frac{\pi}{2}$
   (c) $n\pi + (-1)^n \frac{5\pi}{6}$ (d) $n\pi + (-1)^n \frac{7\pi}{6}$

15) $\sec^2\theta = \frac{4xy}{(x+y)^2}$ is true if and only if
(1996 − 1*Mark*)
   (a) $x + y = 0$ (b) $x = y, x \neq 0$
   (c) $x = y$ (d) $x \neq 0, y \neq 0$

16) In a triangle PQR, $\angle R = \frac{\pi}{2}$. If $\tan \frac{P}{2}$ and $\tan \frac{Q}{2}$ are the roots of the equation $ax^2 + bx + c = 0\ (a \neq 0)$ then
(1999 − 2*Marks*)

(a) $a + b = c$ (b) $b + c = a$

(c) $a + c = b$ (d) $b = c$

17) Let $f(\theta) = \sin\theta(\sin\theta + \sin 3\theta)$. Then $f(\theta)$ is (2000S)

(a) ≥ 0 only when $\theta \geq 0$ (b) ≤ 0 for all real θ

(c) ≥ 0 for all real θ (d) ≤ 0 only when $\theta \leq 0$

18) The number of distinct real roots of

$$\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} \tag{1}$$

(2001S)

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

19) The maximum value of $(\cos\alpha_1)(\cos\alpha_2)(\cos\alpha_3)\ldots(\cos\alpha_n)$ under the restrictions

$$0 \leq \alpha_1, \alpha_2, \ldots, \alpha_n \leq \frac{\pi}{2} \tag{2}$$

and

$$(\cot\alpha_1)(\cot\alpha_2)(\cot\alpha_3)\ldots(\cot\alpha_n) = 1 \tag{3}$$

(2001S)

(a) $\frac{1}{2^{\frac{n}{2}}}$ (b) $\frac{1}{2^n}$ (c) $\frac{1}{2n}$ (d) 1