Short Answer Type Questions – I

[2 marks]

Que 1. Evaluate cos 48° cos 42° - sin 48° sin 42°.

Sol. cos 48° cos 42° - sin 48° sin 42° = cos (90° - 42°) cos (90° - 48°) – sin 48° sin 42°
= sin 42° sin 48° - sin 48° sin 42° [$\because \cos(90 - \theta) = \sin\theta$]
= 0

Que 2. Find the value of: $3\sin^2 20° - 2\tan^2 45° + 3\sin^2 70°$

Sol. $3\sin^2 20° - 2\tan^2 45° + 3\sin^2 70°$
$= 3\sin^2(90° - 70°) - 2(1)^2 + 3\sin^2 70°$ [$\because \tan 45° = 1$]
$= 3\cos^2 70° - 2 + 3\sin^2 70°$ [$\because \sin(90 - \theta) = \cos\theta$]
$= 3(\sin^2 70° + \cos^2 70°) - 2$
$= 3 \times 1 - 2 = 3 - 2 = 1.$ [$\because \sin^2\theta + \cos^2\theta = 1$]

Que 3. If $\sin^2 A = 2\sin A$ then find the value of A.

Sol. $\sin^2 A = 2\sin A$.
$\Rightarrow \sin^2 A - 2\sin A = 0 \Rightarrow \sin A(\sin A - 2) = 0$
$\Rightarrow$ either $\sin A = 0$ or $\sin A - 2 = 0$.
$\Rightarrow A = 0°$ [$\sin A = 2, Not\ possible$]
$\therefore$ Value of $\angle A = 0°$

Que 4. Find maximum value of $\frac{1}{sec\,\theta}, 0° \leq \theta \leq 90°$.

Sol. $\frac{1}{sec\,\theta}, (0° \leq \theta \leq 90°)$ (Given)

$\because$ sec θ is in the denominator

$\therefore$ The min. value of sec θ will return max. Value for $\frac{1}{sec\,\theta}$.

But the min. Value of sec θ is sec 0° = 1.

Hence, the max. Value of $\frac{1}{sec\,0°} = \frac{1}{1} = 1.$

Que 5. Given that $\sin\theta = \frac{a}{b}$, find the value of $\tan\theta$.

Sol. $\sin\theta = \frac{a}{b}$

$$\Rightarrow \cos\theta = \sqrt{1 - \sin^2\theta} = \sqrt{1 - \frac{a^2}{b^2}} = \sqrt{\frac{b^2 - a^2}{b^2}} = \sqrt{\frac{b^2 - a^2}{b}}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{a \mid b}{\sqrt{\frac{b^2 - a^2}{b}}} = \frac{a}{\sqrt{b^2 - a^2}}$$

Que 6. If sin θ = cos θ, then find the value of 2 tan θ + cos^2 θ.

Sol. sin θ = cos θ (Given)

It means value of θ = 45°

Now, $2\tan\theta + \cos^2\theta = 2\tan 45° + \cos^2 45°$

$$= 2 \times 1 + \left(\frac{1}{\sqrt{2}}\right)^2 \quad \left(\because \tan 45° = 1, \cos 45° = \frac{1}{\sqrt{2}}\right)$$

$$= 2 + \frac{1}{2} = \frac{4+1}{2} = \frac{5}{2}$$

Que 7. I sin (x - 20°) = cos (3x - 10)°, then find the value of x.

Sol. $\sin (x - 20)° = \cos (3x - 10)°$

$\Rightarrow \cos [90° - (x - 20)°] = \cos (3x - 10)°$

By comparing the coefficient

$90° - x° + 20° = 3x° - 10° \Rightarrow 110° + 10° = 3x° + x°$

$$120° = 4x° \qquad \Rightarrow x° = \frac{120°}{4} = 30°$$

Que 8. If sin^2 A = $\frac{1}{2}$ tan^2 45°, where A is an acute angle, then find the value of A.

Sol. $\sin^2 A = \frac{1}{2}\tan^2 45° \quad \Rightarrow \quad \sin^2 A = \frac{1}{2}(1)^2 \quad [\because \tan 45° = 1]$

$\Rightarrow \sin^2 A = \frac{1}{2} \quad \Rightarrow \quad \sin A = \frac{1}{\sqrt{2}}$

Hence, $\angle A = 45°$