Chapter 10

TRIGONOMETRIC IDENTITIES

MULTIPLE CHOICE QUESTIONS

(1) $\sin 2\alpha =$

(a) $\cos^2\alpha - \sin^2\alpha$ (b) $2\sin^2\alpha + 1$

(c) $2\sin\alpha \cos\alpha$ (d) $\sin\alpha . \cos\alpha$

[Lahore Board 2005-08, Lahore Board 2015]

(2) $\cos 3\alpha =$

(a) $4\cos^3\alpha - 3\cos\alpha$ (b) $3\cos\alpha - 4\cos^3$

(c) $3\cos\alpha + 4\cos^3\alpha$ (d) None of these

[Lahore Board 2005]

(3) $\sec x =$

(a) $\sec(x + 2\pi)$ (b) $\sec(x + \pi)$

(c) $\cos x$ (d) $\sin x$

[Lahore Board 2005]

(4) $\sin P + \sin Q =$

(a) $2 \sin \frac{P+Q}{2} \cos \frac{P-Q}{2}$ (b) $-2 \sin \frac{P+Q}{2} . \sin \frac{P-Q}{2}$

(c) $2 \cos \frac{P+Q}{2} . \cos \frac{P-Q}{2}$ (d) None of these

[Lahore Board 2005]

(5) $\cos(\alpha - \beta) =$

(a) $\cos\alpha \cos\beta + \sin\alpha \sin\beta$ (b) $\cos\alpha \cos\beta - \sin\alpha \sin\beta$

(c) $\sin\alpha \cos\beta + \cos\alpha \sin\beta$ (d) $\sin\alpha \cos\beta - \cos\alpha \sin\beta$

[Gujranwala Board 2005]

(6) $\text{cosec}(\pi - \alpha) =$

(a) $\sin\alpha$ (b) $\cos\alpha$

(c) $\cot\alpha$ (d) $\text{cosec}\alpha$

[Gujranwala Board 2005]

(7) $1 + \cos 2\alpha =$

(a) $\cos^2\alpha$ (b) $2\cos^2\alpha$

(c) $\sin^2\alpha$ (d) $2\sin\alpha$

[Gujranwala Board 2005]

(8) $\cos\left(\frac{\pi}{2} - \beta\right) =$

(a) $\cos\beta$ (b) $\cos\frac{\pi}{2}$

(c) $\sin\beta$ (d) $-\sin\beta$

[Gujranwala Board 2005]

(9) $2\sin\alpha\cos\beta =$

(a) $\sin(\alpha + \beta) + \cos(\alpha - \beta)$ (b) $\sin(\alpha + \beta) + \sin(\alpha - \beta)$

(c) $\sin(\alpha + \beta) - \sin(\alpha - \beta)$ (d) None of these

[Gujranwala Board 2006]

(10) $\sec\left(\frac{3\pi}{2} - \theta\right) =$

(a) $\text{cosec}\theta$ (b) $-\text{cosec}\theta$

(c) $-\sec\theta$ (d) None of these

[Gujranwala Board 2006]

(11) $\pm\sqrt{\frac{1 + \cos\alpha}{2}} =$

(a) $\cos\frac{\alpha}{2}$ (b) $\sin\frac{\alpha}{2}$

(c) $\tan\frac{\alpha}{2}$ (d) None of these

[Gujranwala Board 2006]

(12) $\sin 3\alpha =$

(a) $3\sin\alpha + 4\sin^3\alpha$ (b) $4\sin\alpha + 3\sin^3\alpha$

(c) $3\sin\alpha - 4\sin^3\alpha$ (d) $3\sin\alpha + 4\sin^3\alpha$

[Lahore Board 2006]
[Gujranwala Board 2006]

(13) If $r\cos\theta = 3$, $r\sin\theta = 4$ then r is:

(a) 25 (b) –5

(c) 5 (d) –25

[Lahore Board 2006]

(14) $\tan(180° + \alpha)$ is equal to:

(a) $\tan\alpha$ (b) $-\tan\alpha$

(c) $\cot\alpha$ (d) $-\cot\alpha$

[Lahore Board 2006]

(15) $\cos 2\theta$ is equal to:

(a) $\dfrac{1-\tan^2\theta}{1+\tan^2\theta}$ (b) $\dfrac{1-\tan^2\theta}{1-\tan^2\theta}$

(c) $\dfrac{2\tan\theta}{1+\tan^2\theta}$ (d) $\dfrac{1+\tan^2\theta}{2\tan\theta}$

[Gujranwala Board 2007]

(16) $\sin\theta =$

(a) $2\sin\dfrac{\theta}{2}$ (b) $\sin\dfrac{\theta}{2}.\cos\dfrac{\theta}{2}$

(c) $2\cos^2\dfrac{\theta}{2}$ (d) $2\sin\dfrac{\theta}{2}.\cos\dfrac{\theta}{2}$

[Lahore Board 2007]

(17) co-ratio of cosine is:

(a) sec (b) sine

(c) cosec (d) cos

[Lahore Board 2008]

(18) $\tan 2\alpha$ equals:

(a) $\dfrac{\tan\alpha}{1-\tan^2\alpha}$ (b) $\dfrac{\tan 2\alpha}{1-\tan^2\alpha}$

(c) $\dfrac{2\tan\alpha}{1-\tan^2\alpha}$ (d) $\dfrac{2\tan\alpha}{1+\tan^2\alpha}$

[Gujranwala Board 2008]

(19) $\tan(270° + \theta)$ is equal to:

(a) $\cot\theta$ (b) $\tan\theta$

(c) $-\cot\theta$ (d) $-\tan\theta$

[Lahore Board 2014, Gujranwala Board 2009]

(20) $\tan\dfrac{\alpha}{2}$ is equal to:

(a) $\pm\sqrt{\dfrac{1-\cos\alpha}{1+\cos\alpha}}$ (b) $\sqrt{\dfrac{1+\cos\alpha}{1-\cos\alpha}}$

(c) $\pm\sqrt{\dfrac{1-\cos\alpha}{2}}$ (d) $\sqrt{\dfrac{1+\cos\alpha}{2}}$

[Gujranwala Board 2009]

(21) $\cos\left(\dfrac{\pi}{2}+\theta\right)$ equals:

(a) $\cos\theta$ (b) $-\sin\theta$

(c) $\sin\theta$ (d) $-\cos\theta$

[Lahore Board 2009]

(22) $2\sin12^\circ\sin46^\circ$ equals:

(a) $\cos34^\circ + \cos58^\circ$ (b) $\sin34^\circ - \sin58^\circ$

(c) $\sin34^\circ + \sin58^\circ$ (d) $\cos34^\circ - \cos58^\circ$

[Lahore Board 2009]

(23) $\sin\left(\dfrac{\pi}{2}-\theta\right)$ equals:

(a) $\cos\theta$ (b) $\sin\theta$

(c) $-\cos\theta$ (d) $-\sin\theta$

[Lahore Board 2009]

(24) $2\sin\alpha\cos\beta$ equals:

(a) $\sin(\alpha+\beta)-\sin(\alpha-\beta)$ (b) $\cos(\alpha+\beta)+\cos(\alpha-\beta)$

(c) $\sin(\alpha+\beta)+\sin(\alpha-\beta)$ (d) $\cos(\alpha+\beta)-\cos(\alpha-\beta)$

[Lahore Board 2009]

(25) $\sin\left(\dfrac{3\pi}{2}+\theta\right) =$

(a) $\cos\theta$ (b) $-\cos\theta$

(c) $\sin\theta$ (d) $-\sin\theta$

[Lahore Board 2010]

(26) $2\cos5\theta\,.\,\sin3\theta\ =$

(a) $\sin8\theta - \sin2\theta$ (b) $\sin8\theta + \sin2\theta$

(c) $\cos8\theta + \cos2\theta$ (d) $\sin4\theta - \sin\theta$

[Lahore Board 2010]

(27) $\cos\frac{\alpha}{2}$ is equal to:

(a) $\frac{1+\cos\alpha}{2}$ (b) $\frac{1-\cos\alpha}{2}$

(c) $\frac{1+\sin\alpha}{2}$ (d) $\pm\sqrt{\frac{1+\cos\alpha}{2}}$

[Gujranwala Board 2010]

(28) $\tan 2\alpha$ = ________

(a) $\frac{2\tan\alpha}{1-\tan^2\alpha}$ (b) $\frac{2\tan\alpha}{1+\tan^2\alpha}$

(c) $\frac{\tan\alpha}{1-\tan^2\alpha}$ (d) $\frac{\tan\alpha}{1+\tan^2\alpha}$

[Lahore Board 2012]

(29) $\cos(\pi-\theta)$ =

(a) $\sin\theta$ (b) $-\sin\theta$

(c) $\cos\theta$ (d) $-\cos\theta$

[Lahore Board 2012]

(30) $\cos(\pi-\theta)$ =

(a) $\sin\theta$ (b) $-\sin\theta$

(c) $\cos\theta$ (d) $-\cos\theta$

[Lahore Board 2013]

(31) $\sin(-300°)$ =

(a) $-\frac{\sqrt{3}}{2}$ (b) $\frac{\sqrt{3}}{2}$

(c) $\frac{2}{\sqrt{3}}$ (d) 0

[Lahore Board 2013]

(32) Distance between the points A(3, 8) and B(5, 6) is:

(a) $\sqrt{2}$ (b) $2\sqrt{2}$

(c) $\sqrt{3}$ (d) $3\sqrt{3}$

(33) Fundamental law of trigonometry is ________ where α, β are any two angles:

(a) $\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

(b) $\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

(c) $\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

(d) $\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

(34) $\cos\frac{\pi}{12}$ =

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

(c) $\frac{\sqrt{3}+1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

(35) sec (– 300°) =

(a) 1 (b) –1

(c) 2 (d) –2

(36) If α, β, γ are angles of triangle then $\cos(\alpha+\beta)$ = ________

(a) $\cos\gamma$ (b) $-\cos\gamma$

(c) $\sin\gamma$ (d) $\sin\frac{\gamma}{2}$

(37) $\sin(\alpha+\beta) . \sin(\alpha-\beta)$ =

(a) $\sin^2\alpha - \sin^2\beta$ (b) $\sin^2\alpha + \sin^2\beta$

(c) $\cos^2\alpha - \cos^2\beta$ (d) $\cos^2\alpha + \cos^2\beta$

(38) $\frac{\cos 11° + \sin 11°}{\cos 11° - \sin 11°}$ =

(a) tan 65° (b) tan 54°

(c) tan 56° (d) tan 37°

(39) $\frac{\sin A + \sin 2A}{1 + \cos A + \cos 2A}$ =

(a) sinA (b) cosA

(c) cotA (d) tanA

(40) $2\sin 7\theta \cos 3\theta$ =

(a) $\sin 10\theta + \sin 4\theta$ (b) $\sin 10\theta - \sin 4\theta$

(c) $\cos 10\theta + \cos 4\theta$ (d) $\cos 10\theta - \cos 4\theta$

(41) sin5x + sin7x =

(a) 2sin3x cosx (b) 2sinx cosx

(c) 2sinx cos6x (d) 2sin6x cosx

(42) $\sin\left(\frac{\pi}{4}-\theta\right)\sin\left(\frac{\pi}{4}+\theta\right)$ =

(a) $\frac{1}{2}\cos 2\theta$ (b) $\frac{1}{2}\sin 2\theta$

(c) $\frac{1}{2}\sin\theta \cos\theta$ (d) $2\sin\theta . \cos 2\theta$

(43) If $x > y > 0$ then point $P(x, y)$ lies in quadrant:

(a) I (b) II (c) III (d) IV

(44) $\tan\left(-\alpha + \frac{\pi}{2} - \beta\right) =$

(a) $\tan(\alpha + \beta)$ (b) $\tan(\alpha - \beta)$
(c) $\cot(\alpha + \beta)$ (d) $\cot(\alpha - \beta)$

(45) If $\cot\alpha + \cot\theta = 0$ then $\alpha = ?$

(a) $\frac{\pi}{2} - \theta$ (b) $\pi - \theta$
(c) $\pi + \theta$ (d) None of these

(46) If $\frac{2\cos\theta(1 - \cos^2\theta)}{\sin 2\theta} > 0$ and $\frac{\sec^2\theta - 1}{\tan^2\theta \,.\, \cot\theta} < 0$ then 'θ' lies in the quadrant:

(a) I (b) II
(c) III (d) IV

(47) $\sec\theta \neq$

(a) $\frac{\sqrt{1 + \cot^2\theta}}{\cot\theta}$ (b) $\frac{1}{\sqrt{1 - \sin^2\theta}}$
(c) $\sqrt{\text{cosec}^2\theta - 1}$ (d) $\frac{\text{cosec}\theta}{\sqrt{\text{cosec}^2\theta - 1}}$

(48) $\tan\frac{5\alpha}{2} =$

(a) $\pm\sqrt{\frac{1 - \cos 5\alpha}{1 + \cos 5\alpha}}$ (b) $\pm\sqrt{\frac{1 - \cos\frac{5\alpha}{2}}{1 + \cos\frac{5\alpha}{2}}}$
(c) $\pm\sqrt{\frac{1 + \cos 5\alpha}{1 - \cos 5\alpha}}$ (d) None of these

(49) $\cos\alpha - 2\cos\frac{\alpha + \beta}{2} \,.\, \cos\frac{\alpha - \beta}{2} + \cos\beta =$

(a) $\sin\alpha \cos\beta$ (b) 0
(c) $\sin(\alpha - \beta) + \cos\alpha$ (d) $\cos\alpha \,.\, \cos\beta$

(50) The value of $\cos 315°$ is:

(a) 0 (b) 1
(c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{\sqrt{2}}$

(51) $\cos 2\alpha =$ ———

(a) $2\cos^2\alpha + 1$ (b) $2\cos^2\alpha - 1$
(c) $2\sin^2\alpha + 1$ (d) $2\sin^2 d - 1$

Answers

(1)	c	***(2)***	a	***(3)***	a	***(4)***	a	***(5)***	a
(6)	d	***(7)***	b	***(8)***	c	***(9)***	b	***(10)***	b
(11)	a	***(12)***	c	***(13)***	c	***(14)***	a	***(15)***	a
(16)	d	***(17)***	b	***(18)***	c	***(19)***	c	***(20)***	a
(21)	b	***(22)***	d	***(23)***	a	***(24)***	c	***(25)***	b
(26)	a	***(27)***	d	***(28)***	a	***(29)***	d	***(30)***	d
(31)	b	***(32)***	b	***(33)***	b	***(34)***	d	***(35)***	c
(36)	d	***(37)***	c	***(38)***	c	***(39)***	d	***(40)***	a
(41)	d	***(42)***	a	***(43)***	a	***(44)***	c	***(45)***	b
(46)	b	***(47)***	c	***(48)***	a	***(49)***	b	***(50)***	d
(51)	b								

SOLUTION

Q.6 $\text{cosec}\,(\pi - \alpha)$

$$= \frac{1}{\sin(\pi-\alpha)} = \frac{1}{\sin\pi\,\cos\alpha - \cos\pi\,\sin\alpha}$$

$$= \frac{1}{0-(-1)\sin\alpha}$$

$$= \frac{1}{\sin\alpha} = \text{cosec}\alpha$$

Q.7 As, $\cos 2\alpha = 2\cos^2\alpha - 1$

$$1 + \cos 2\alpha = 2\cos^2\alpha$$

Q.8 $\cos\left(\frac{\pi}{2} - \beta\right)$

$$= \cos\frac{\pi}{2}\cos\beta + \sin\frac{\pi}{2}\,.\,\sin\beta$$

$$= 0 + (1)\sin\beta$$

$$= \sin\beta$$

Q.13 $r\cos\theta = 3$, $r\sin\theta = 4$

$r^2\cos^2\theta = 9$ ……… (1) $r^2\sin^2\theta = 16$ ……… (2)

Adding (1) and (2).

$$r^2\cos^2\theta + r^2\sin^2\theta = 9 + 16$$

$$r^2(\cos^2\theta + \sin^2\theta) = 25$$

$$r^2 = 25$$

$$r = 5$$

Q.14 $\tan(180° + \alpha)$

$= \tan(\pi + \alpha)$

$= \tan\alpha$

Q.15 $\cos 2\theta$

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

$$= \frac{\cos^2\theta - \sin^2\theta}{1}$$

$$= \frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta + \sin^2\theta}$$

$$= \frac{\dfrac{\cos^2\theta - \sin^2\theta}{\cos^2\theta}}{\dfrac{\cos^2\theta + \sin^2\theta}{\cos^2\theta}}$$

$$= \frac{\dfrac{\cos^2\theta}{\cos^2\theta} - \dfrac{\sin^2\theta}{\cos^2\theta}}{\dfrac{\cos^2\theta}{\cos^2\theta} + \dfrac{\sin^2\theta}{\cos^2\theta}}$$

$$= \frac{1 - \tan^2\theta}{1 + \tan^2\theta}$$

Q.16 As,

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$\Rightarrow \quad \sin\theta = 2\sin\frac{\theta}{2} \cdot \cos\frac{\theta}{2}$$

Q.19 $\tan(270° + \theta)$

$$= \tan\left(\frac{3\pi}{2} + \theta\right)$$

$$= -\cot\theta$$

Q.22 As,

$$-2\sin\alpha\sin\beta = \cos(\alpha + \beta) - \cos(\alpha - \beta)$$

$$2\sin\alpha\sin\beta = -\cos(\alpha + \beta) + \cos(\alpha - \beta)$$

$$\Rightarrow \quad 2\sin 12° \sin 46° = -\cos(12° + 46°) + \cos(12° - 46°)$$

$$= -\cos 58° + \cos(-34°)$$

$$= -\cos 58° + \cos 34°$$

$$= \cos 34° - \cos 58°$$

Q.26 As,

$$2\cos\alpha\sin\beta = \sin(\alpha + \beta) - \sin(\alpha - \beta)$$

$$2\cos 5\theta \sin 3\theta = \sin(5\theta + 3\theta) - \sin(5\theta - 3\theta)$$

$$= \sin 8\theta - \sin 2\theta$$

Q.30

$$|AB| = \sqrt{(5-3)^2 + (6-8)^2}$$

$$= \sqrt{(2)^2 + (-2)^2}$$

$$= \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$$

Q.32 $\cos\frac{\pi}{12}$

$$\frac{\pi}{12} = \frac{\pi}{12}\times\frac{180}{\pi} = 15^\circ$$

$$\cos\frac{\pi}{12} = \cos 15^\circ$$

$$= \cos(45^\circ - 30^\circ)$$

$$= \cos 45^\circ . \cos 30^\circ + \sin 45^\circ \sin 30^\circ$$

$$= \frac{1}{\sqrt{2}} . \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} . \frac{1}{2}$$

$$= \frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}}$$

$$= \frac{\sqrt{3}+1}{2\sqrt{2}}$$

Q.33 $\sec(-300^\circ)$

$$= \frac{1}{\cos(-300^\circ)}$$

$$= \frac{1}{\cos(300^\circ)}$$

$$= \frac{1}{\cos(360^\circ - 60^\circ)}$$

$$= \frac{1}{\cos\left(2\pi - \frac{\pi}{3}\right)}$$

$$= \frac{1}{\cos\frac{\pi}{3}} = \frac{1}{\frac{1}{2}} = 2$$

Q.34 As, $\alpha + \beta + \gamma = 180^\circ$

$$\alpha + \beta = 180^\circ - \gamma$$

$\Rightarrow$ $\cos(\alpha + \beta)$

$$= \cos(180^\circ - \gamma)$$

$$= -\cos\gamma$$

Q.35 $\sin(\alpha + \beta) \,.\, \sin(\alpha - \beta)$

$$= (\sin\alpha \cos\beta + \cos\alpha \sin\beta)(\sin\alpha \cos\beta - \cos\alpha \sin\beta)$$
$$= (\sin\alpha \cos\beta)^2 - (\cos\alpha \sin\beta)^2$$
$$= \sin^2\alpha \cos^2\beta - \cos^2\alpha \sin^2\beta$$
$$= \sin^2\alpha (1 - \sin^2\beta) - (1 - \sin^2\alpha) \sin^2\beta$$
$$= \sin^2\alpha - \sin^2\alpha \sin^2\beta - \sin^2\beta + \sin^2\alpha \sin^2\beta$$
$$= \sin^2\alpha - \sin^2\beta$$

Q.36 As,

$$\tan 56^\circ = \tan(45^\circ + 11^\circ) = \frac{\sin(45^\circ + 11^\circ)}{\cos(45^\circ + 11^\circ)}$$
$$= \frac{\sin 45^\circ \cos 11^\circ + \cos 45^\circ \sin 11^\circ}{\cos 45^\circ \cos 11^\circ - \sin 45^\circ \sin 11^\circ}$$
$$= \frac{\frac{1}{\sqrt{2}} \,.\, \cos 11^\circ + \frac{1}{\sqrt{2}} \sin 11^\circ}{\frac{1}{\sqrt{2}} \cos 11^\circ - \frac{1}{\sqrt{2}} \sin 11^\circ}$$
$$= \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$$

Q.37 $\dfrac{\sin A + \sin 2A}{1 + \cos A + \cos 2A}$

$$= \frac{\sin A + \sin 2A}{1 + \cos A + 2\cos^2 A - 1}$$
$$= \frac{\sin A + 2\sin A \cos A}{\cos A + 2\cos^2 A}$$
$$= \frac{\sin A(1 + 2\cos A)}{\cos A(1 + 2\cos A)}$$
$$= \frac{\sin A}{\cos A} = \tan A$$

Q.38 As,

$$2\sin\alpha \cos\beta = \sin(\alpha + \beta) + \sin(\alpha - \beta)$$
$$2\sin 7\theta \cos 3\theta = \sin(7\theta + 3\theta) + \sin(7\theta - 3\theta)$$
$$= \sin 10\theta + \sin 4\theta$$

Q.39 As,

$$\sin P + \sin Q = 2\sin\frac{P+Q}{2}.\cos\frac{P-Q}{2}$$

$$\Rightarrow \quad \sin 5x + \sin 7x = 2\sin\frac{5x+7x}{2}\cos\frac{5x-7x}{2}$$

$$= 2\sin\frac{12x}{2}.\cos\frac{-2x}{2}$$

$$= 2\sin 6x . \cos x$$

Q.40 As,

$$-2\sin\alpha\sin\beta = \cos(\alpha+\beta) - \cos(\alpha-\beta)$$

$$\sin\alpha\sin\beta = -\frac{1}{2}[\cos(\alpha+\beta) - \cos(\alpha-\beta)]$$

$$\Rightarrow \quad \sin\left(\frac{\pi}{4}-\theta\right).\sin\left(\frac{\pi}{4}+\theta\right) = -\frac{1}{2}\left[\cos\left(\frac{\pi}{4}-\theta+\frac{\pi}{4}+\theta\right)-\cos\left(\frac{\pi}{4}-\theta-\frac{\pi}{4}-\theta\right)\right]$$

$$= -\frac{1}{2}\left[\cos\left(2\frac{\pi}{4}\right)-\cos(-2\theta)\right]$$

$$= -\frac{1}{2}\left[\cos\frac{\pi}{2}-\cos 2\theta\right]$$

$$= -\frac{1}{2}[0-\cos 2\theta]$$

$$= -\frac{1}{2}\cos 2\theta$$

Q.42 $\tan\left(-\alpha+\frac{\pi}{2}-\beta\right)$

$= \tan\left(\frac{\pi}{2}-(\alpha+\beta)\right)$

$= \cot(\alpha+\beta)$

Q.43 As, $\cot\alpha + \cot\theta = 0$

$\Rightarrow \quad \cot\alpha = -\cot\theta$

Which is possible only if $\alpha = \pi - \theta$

Q.44

$$\frac{2\cos\theta(1-\cos^2\theta)}{\sin 2\theta} > 0$$

$\Rightarrow \quad \dfrac{2\cos\theta \,.\, \sin^2\theta}{2\sin\theta \,.\, \cos\theta} > 0$

$\Rightarrow \quad \sin\theta > 0$

Also,

$\dfrac{\sec^2\theta - 1}{\tan^2\theta \,.\, \cot\theta} < 0$

$\Rightarrow \quad \dfrac{\tan^2\theta}{\tan^2\theta \,.\, \cot\theta} < 0$

$\Rightarrow \quad \dfrac{1}{\cot\theta} < 0$

$\Rightarrow \quad \tan\theta < 0$

$\Rightarrow$ Quadrant will be II

Q.45 As,

$\sqrt{\operatorname{cosec}^2\theta - 1}$

$= \sqrt{\cot^2\theta} = \cot\theta \neq \sec\theta$

Q.46 As,

$\tan\dfrac{\alpha}{2} = \pm\sqrt{\dfrac{1 - \cos\alpha}{1 + \cos\alpha}}$

$\tan\dfrac{5\alpha}{2} = \pm\sqrt{\dfrac{1 - \cos5\alpha}{1 + \cos5\alpha}}$

Q.47 $\cos\alpha - 2\cos\dfrac{\alpha + \beta}{2} \,.\, \cos\dfrac{\alpha - \beta}{2} + \cos\beta$

$= \cos\alpha - [\cos\alpha + \cos\beta] + \cos\beta$

$= \cos\alpha - \cos\alpha - \cos\beta + \cos\beta$

$= 0$

Q.50 $\cos 315°$

$= \cos(3 \times 90° + 45°)$

$= \sin 45° = \dfrac{1}{\sqrt{2}}$