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Chapter End Test

(2019-20)

Date : __/__2019	Mathematics	Class
Duration: 45 Min. Max. Marks: 25	**Topic :** Trigonometric Functions	XI

Instructions:

- All questions are compulsory.

1. Which of the following is not correct?

(a) $\sin\theta = -\frac{1}{5}$ (b) $\cot\theta = 1$ (c) $\sec\theta = \frac{1}{2}$ (d) $\tan\theta = 20$

2. If $\sin\theta + \text{cosec}\,\theta = 2$, then $\sin^2\theta + \text{cosec}^2\theta$ is equal to

(a) 1 (b) 4 (c) 2 (d) none of these

3. The value of $\frac{1-\tan^2 15^\circ}{1+\tan^2 15^\circ}$ is

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

4. The value of $\cos1^\circ \cos2^\circ \cos3^\circ \ldots\ldots \cos179^\circ$ is

(a) 1 (b) 0 (c) 1 (d) –1

5. The value of $\tan1^\circ \tan2^\circ \tan3^\circ \ldots\ldots \tan89^\circ$ is

(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) none of these

6. If $\tan\theta = 3$ and θ lies in third quadrant, then the value of $\sin\theta$ is

(a) $\frac{1}{\sqrt{10}}$ (b) $-\frac{1}{\sqrt{10}}$ (c) $\frac{-3}{\sqrt{10}}$ (d) $\frac{3}{\sqrt{10}}$

7. If $\sin\theta = -\frac{4}{5}$ and θ lies in third quadrant then the value of $\cot\left(\frac{\theta}{2}\right)$ is

(a) $\frac{1}{5}$ (b) $-\frac{1}{\sqrt{10}}$ (c) $\frac{-1}{\sqrt{5}}$ (d) $\frac{1}{\sqrt{10}}$

8. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$ then the value of $(\theta + \phi)$ is

(a) $\frac{\pi}{6}$ (b) π (c) 0 (d) $\frac{\pi}{4}$

9. The value of $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ is

(a) $2\cot\theta$ (b) $2\sin\theta$ (c) 1 (d) 0

10. If $\sin\theta + \cos\theta = 1$, then value of $\sin 2\theta$ is

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

11. The minimum value of $3\cos x + 4\sin x + 8$ is

(a) 5 (b) 9 (c) 7 (d) 3

12. In a circle of central angle 60° which intercepts an arc of length 37.4 cm have radius equal to

(a) 35.2 cm (b) 35.7 cm (c) 34.2 cm (d) 37 cm

13. The value of $\sin 15°$ is equal to

(a) $-\frac{1}{4}$ (b) $\frac{2-\sqrt{2}}{3}$ (c) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (d) none of these

14. The value of $\tan\frac{13\pi}{12}$ is

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

15. The value of $2\sin 75° \sin 15°$ is

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $-\frac{1}{4}$

16. Prove that **[4]**

(i) $\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = -\frac{\sin 2x}{\cos 10x}$

(ii) $\cos 4x = 1 - 8\sin^2 x \cos^2 x$

17. (a) (i) Solve $\tan x = \sqrt{3}$ **[1]**

(ii) Prove that $\cos\left(\frac{\pi}{4}-x\right)\cos\left(\frac{\pi}{4}-y\right) - \sin\left(\frac{\pi}{4}-x\right)\sin\left(\frac{\pi}{4}-y\right) = \sin(x+y)$ **[2]**

(b) Solve $\cos 3x + \cos x - \cos 2x = 0$ **[3]**

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Hints/Solution to Chapter End Test

(2019-20)

Date : __/__2019	Mathematics	Class
Duration: 1 Hr. Max. Marks: 30	**Topic :** Trigonometric Functions	XI

Section – A

1. (c) **2.** (c)
3. (c) **4.** (b)
5. (b) **6.** (c)
7. (c) **8.** (d)
9. (d) **10.** (c)
11. (d) **12.** (b)
13. (c) **14.** (b)
15. (b)

Section – B

16. (i) $\text{LHS} = \dfrac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x}$

$$= \frac{-2\sin\left(\frac{9x+5x}{2}\right)\sin\left(\frac{9x-5x}{2}\right)}{2\sin\left(\frac{17x-3x}{2}\right)\cos\left(\frac{17x+3x}{2}\right)}$$

$$= \frac{-\sin 7x \sin 2x}{\sin 7x \cos 10x} = -\frac{\sin 2x}{\cos 10x} = \text{RHS}$$

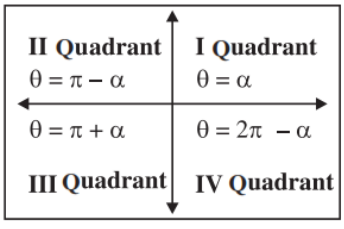
(ii) LHS = $\cos 4x = \cos(2 \times 2x)$
$= 1 - 2\sin^2(2x)$
$= 1 - 2(2\sin x \cos x)^2$
$= 1 - 8\sin^2 x \cos^2 x$
= RHS

17. (a) (i) $\tan\frac{\pi}{3} = \sqrt{3} \therefore \tan\frac{\pi}{3} = \tan\alpha \Rightarrow \alpha = \frac{\pi}{3}$

$$\tan\frac{\pi}{3} = \sqrt{3}$$

tan x is positive in I quadrant and III quadran
Using the chart given here:

$$x = \frac{\pi}{3}, x = \pi + \frac{\pi}{3}$$



$x = \frac{\pi}{3}, x = \frac{4\pi}{3}$

Therefore, principal solutions are
$\pi/3$ and $4\pi/3$.

$\tan x = \tan\frac{\pi}{3}$

$x = n\pi + \frac{\pi}{3} \quad [\because \tan x = \tan\theta \Rightarrow x = n\pi + \theta, \quad n \in Z]$

Therefore, general solution is

(ii) $\text{LHS} = \cos\left(\frac{\pi}{4} - x\right)\cos\left(\frac{\pi}{4} - y\right) - \sin\left(\frac{\pi}{4} - x\right)\sin\left(\frac{\pi}{4} - y\right)$

$[\because \cos A\cos B - \sin A\sin B = \cos(A + B)]$

$= \cos\left(\frac{\pi}{4} - x + \frac{\pi}{4} - y\right) \quad \left[\text{Here A} = \left(\frac{\pi}{4} - x\right), \quad \text{B} = \left(\frac{\pi}{4} - y\right)\right]$

$= \cos\left(\frac{\pi}{2} - (x + y)\right)$

$= \sin(x + y) = \text{RHS}$

(b) $2\cos\left(\frac{3x + x}{2}\right)\cos\left(\frac{3x - x}{2}\right) - \cos 2x = 0$

$2\cos 2x\cos x - \cos 2x = 0$

$\cos 2x(2\cos x - 1) = 0$

$\cos 2x = 0, \ \cos x = \frac{1}{2} \quad [\because \cos x = \cos\theta \Rightarrow x = 2n\pi \pm \theta, \quad n \in Z]$

$2x = (2n + 1)\frac{\pi}{2} \quad ; \cos x = \cos\frac{\pi}{3}$

$x = (2n + 1)\frac{\pi}{4}; \ 2n\pi \pm \frac{\pi}{3}, \quad n \in Z$

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