

UNIT TEST – 7

STD : X
SUBJECT : MATHS

TIME : 1 ½ Hrs
MARKS : 50

TRIGONOMETRY
SECTION – I

10 x 1 = 10

NOTE: (i) Answer all the 10 questions

(ii) Choose the correct answer from the given four alternatives and write the option code and the corresponding answer

1. $(1 - \sin^2 \theta) \sec^2 \theta =$

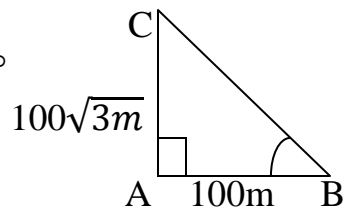
- (a) 0 (b) 1 (c) $\tan^2 \theta$ (d) $\cos^2 \theta$

2. If $x = a \sec \theta$, $y = b \tan \theta$, then the value of $\frac{x^2}{a^2} - \frac{y^2}{b^2} =$

- (a) 1 (b) -1 (c) $\tan^2 \theta$ (d) $\operatorname{cosec}^2 \theta$

3. In the adjoining Figure $\angle ABC =$

- (a) 45° (b) 30° (c) 60° (d) 50°



4. $\cos^4 x - \sin^4 x =$

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

5. If $\tan \theta = \frac{a}{x}$, then the value of $\frac{x}{\sqrt{a^2 + x^2}} =$

- (a) $\cos \theta$ (b) $\sin \theta$ (c) $\operatorname{cosec} \theta$ (d) $\sec \theta$

6. $9 \tan^2 \theta - 9 \sec^2 \theta =$

- (a) 1 (b) 0 (c) 9 (d) -9

7. $(1 - \cos^2 \theta) (1 + \cot^2 \theta) =$

- (a) $\sin^2 \theta$ (b) 0 (c) 1 (d) $\tan^2 \theta$

8. $(1 + \tan^2 \theta) (1 - \sin \theta) (1 + \sin \theta) =$

- (a) $\cos^2 \theta - \sin^2 \theta$ (b) $\sin^2 \theta - \cos^2 \theta$ (c) $\sin^2 \theta + \cos^2 \theta$ (d) 0

9. $\frac{\sec \theta}{\cot \theta + \tan \theta} =$

- (a) $\cot \theta$ (b) $\tan \theta$ (c) $\sin \theta$ (d) $-\cot \theta$

10. $(1 - \cos^2 \theta) (1 + \cot^2 \theta) =$

- (a) $\sin^2 \theta$ (b) 0 (c) 1 (d) $\tan^2 \theta$

SECTION – II

5 x 2 =10

NOTE: (i) Answer 5 questions

(ii) Question number 17 is compulsory. Select any 4 questions from the first 6 questions

11. Prove the identity $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \operatorname{cosec}\theta - \cot\theta$.

12. Prove that $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$.

13. Prove that $\frac{1+\sec\theta}{\sec\theta} = \frac{\sin^2\theta}{1-\cos\theta}$.

14. Prove that $\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cos\theta$.

15. A kite is flying with a string of length 200 m. If the thread makes an angle 30° with the ground, find the distance of the kite from the ground level. (Here, assume that the string is along a straight line)

16. A ladder leaning against a vertical wall, makes an angle of 60° with the ground. The foot of the ladder is 3.5 m away from the wall. Find the length of the ladder.

17. Prove the identity $\frac{\sin\theta}{1-\cos\theta} = \operatorname{cosec}\theta + \cot\theta$.

(OR)

The angle of elevation of the top of a tower as seen by an observer is 30° . The observer is at a distance of $30\sqrt{3}$ m from the tower. If the eye level of the observer is 1.5m above the ground level, then find the height of the tower.

SECTION – III

6 x 5 =30

NOTE: (i) Answer 6 questions

(ii) Question number 25 is compulsory. Select any 5 questions from the first 7 questions

18. Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$.

19. If $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$ and $m \neq n$, then show that $m^2 - n^2 = 4\sqrt{mn}$

20. $\tan\theta = n \tan\alpha$ and $\sin\theta = m \sin\alpha$, then prove that

$$\cos^2\theta = \frac{m^2 - 1}{n^2 - 1}, n \neq \pm 1.$$

- 21.If $\sin\theta$, $\cos\theta$ and $\tan\theta$ are in G.P., then prove that $\cot^6\theta - \cot^2\theta = 1$.
- 22.A vertical tree is broken by the wind. The top of the tree touches the ground and makes an angle 30° with it. If the top of the tree touches the ground 30 m away from its foot, then find the actual height of the tree.
- 23.A jet fighter at a height of 3000 m from the ground, passes directly over another jet fighter at an instance when their angles of elevation from the same observation point are 60° and 45° respectively. Find the distance of the first jet fighter from the second jet at that instant.
- 24.A flag post stands on the top of a building. From a point on the ground, the angles of elevation of the top and bottom of the flag post are 60° and 45° respectively. If the height of the flag post is 10m, find the height of the building. ($\sqrt{3} = 1.732$)
- 25.A person in a helicopter flying at a height of 700 m, observes two objects lying opposite to each other on either bank of a river. The angles of depression of the objects are 30° and 45° . Find the width of the river. $\sqrt{3} = 1.732$.

(OR)

A student sitting in a classroom sees a picture on the black board at a height of 1.5 m from the horizontal level of sight. The angle of elevation of the picture is 30° . As the picture is not clear to him, he moves straight towards the black board and sees the picture at an angle of elevation of 45° . Find the distance moved by the student.