MATHEMATICS
TRIGONOMETRY

Section – A

I)   Two Marks.

1. A tower stands vertically on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is $30°$. Find the height of the tower.

2. A kite is flying at a height of 75 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is $60°$. Find the length of the string, assuming that there is no slack in the string.

3. A player sitting on the top of a tower of height 20 m observes the angle of depression of a ball lying on the ground as $60°$. Find the distance between the foot of the tower and the ball. ($\sqrt{3}$ = 1.732)

4. From the top of a 12 m high building, the angle of elevation of the top of a cable tower is $60°$ and the angle of depression of its foot is $30°$. Determine the height of the tower.

5. Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height 10 $\sqrt{3}$ m.

6. A road is flanked on either side by continuous rows of houses of height 4 $\sqrt{3}$ m with no space in between them. A pedestrian is

standing on the median of the road facing a row house. The angle of elevation from the pedestrian to the top of the house is 30°. Find the width of the road.

7. From the top of a rock 50 $\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30°. Find the distance of the car from the rock.

8. The horizontal distance between two buildings is 70 m. The angle of depression of the top of the first building when seen from the top of the second building is 45°. If the height of the second building is 120 m, find the height of the first building.

9. From the top of a tree of height 13 m the angle of elevation and depression of the top and bottom of another tree are 45° and 30° respectively. Find the height of the second tree. ($\sqrt{3}$ = 1.732)

Section – B

II) Five Marks.

1. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a 30 m high building are 45° and 60° respectively. Find the height of the tower. ($\sqrt{3}$ = 1.732)

2. A TV tower stands vertically on a bank of a canal. The tower is watched from a point on the other bank directly opposite to it. The angle of elevation of the top of the tower is 58° . From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and the width of the canal. (tan 58° = 1.6003)

3. Two trees are standing on flat ground. The angle of elevation of the top of both the trees from a point *X* on the ground is 40° . If the horizontal distance between *X* and the smaller tree is 8 m and the distance of the top of the two trees is 20 m, calculate

     (I) The distance between the point *X* and the top of the smaller tree.

     (II) The horizontal distance between the two trees.
       (cos 40° = 0. 7660)

4. From the top of a tower 50 m high, the angles of depression of the top and bottom of a tree are observed to be 30° and 45° respectively. Find the height of the tree . ($\sqrt 3 = 1.732$)

5. From the top of a 12 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30°. Determine the height of the tower.

6. A pole 5 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point '*A*' on the ground is 60° and the angle of depression to the point '*A*' from the top of the tower is 45°. Find the height of the tower. ($\sqrt3 = 1.732$)

7. To a man standing outside his house, the angles of elevation of the top and bottom of a window are 60° and 45° respectively. If the height of the man is 180 cm and if he is 5 m away from the wall, what is the height of the window? ($\sqrt 3 = 1.732$)

8. A statue 1.6 m tall stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is

60° and from the same point the angle of elevation of the top of the pedestal is 40° . Find the height of the pedestal.

(tan 40° = 0.8391, √3 = 1.732)

9. A flag pole 'h' metres is on the top of the hemispherical dome of radius 'r' metres. A man is standing 7 m away from the dome. Seeing the top of the pole at an angle 45° and moving 5 m away from the dome and seeing the bottom of the pole at an angle 30° . Find

    (I)   The height of the pole

    (II) radius of the dome. (√3 = 1.732)
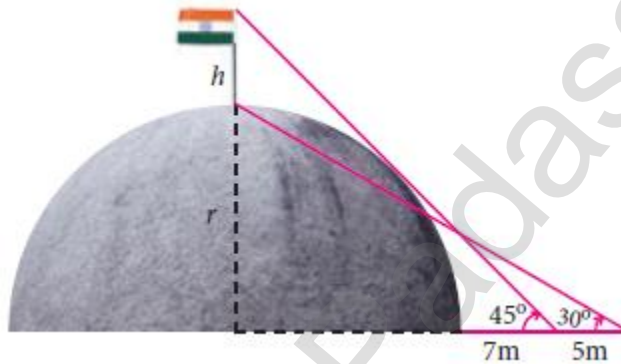
10. The top of a 15 m high tower makes an angle of elevation of 60° with the bottom of an electronic pole and angle of elevation of 30° with the top of the pole. What is the height of the electric pole?

11. An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats.(√ 3 = 1.732)

12. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60°. If the height of the lighthouse is h meters and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is $\dfrac{4h}{\sqrt{3}}$ m .

13. A lift in a building of height 90 feet with transparent glass walls is descending from the top of the building. At the top of the building, the angle of depression to a fountain in the garden is 60°. Two minutes later, the angle of depression reduces to 30°. If the fountain is $30\sqrt{3}$ feet from the entrance of the lift, find the speed of the lift which is descending.

14. A man is standing on the deck of a ship, which is 40 m above water level. He observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° . Calculate the distance of the hill from the ship and the height of the hill. ($\sqrt{3} = 1.732$)

15. The angles of elevation and depression of the top and bottom of a lamp post from the top of a 66 m high apartment are 60° and 30° respectively. Find
    a. The height of the lamp post.
    b. The difference between height of the lamp post and the apartment.
    c. The distance between the lamp post and the apartment
       ($\sqrt{3}=1.732$)

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