



RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATIONS

MATRIC PRACTICE PAPER (2024)

(Mathematics)

Grade: X
Chapter: Trigonometry

Marks: 50 marks
Time: 90 minutes

SECTION A

(6x1=6)

Choose the correct option.

- The angle of depression of the top and bottom of 20m tall building from the top of a multistoried building are 30° and 60° respectively. The height of the multistoried building and the distance between the two buildings (in metres) is
 (a) $20, 10\sqrt{3}$ (b) $30, 5\sqrt{3}$ (c) 20, 10 (d) $30, 10\sqrt{3}$
- The electric pole subtends an angle of 30° at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the pole is 60° . The height of the pole (in metres) is equal to
 (a) $\sqrt{3}b$ (b) $\frac{b}{3}$ (c) $\frac{b}{2}$ (d) $\frac{b}{\sqrt{3}}$
- $\tan\theta \operatorname{cosec}^2\theta - \tan\theta$ is equal to
 (a) $\sec\theta$ (b) $\cot^2\theta$ (c) $\sin\theta$ (d) $\cot\theta$
- If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to
 (a) 25 (b) $\frac{1}{25}$ (c) 5 (d) 1
- $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta)$ is equal to
 (a) 0 (b) 1 (c) 2 (d) -1
- If $\sin\theta + \cos\theta = a$ and $\sec\theta + \operatorname{cosec}\theta = b$, then the value of $b(a^2 - 1)$ is equal to
 (a) 2a (b) 3a (c) 0 (d) 2ab

SECTION B

(4x2=8)

Answer **any 4** questions. Question No. **11** is **compulsory**.

7. From the top of a tree of height 13m 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. ($\sqrt{3} = 1.732$)
8. Find the angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of a tower of height $10\sqrt{3}m$.
9. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$.
10. If $\frac{\cos\alpha}{\cos\beta} = m$ and $\frac{\cos\alpha}{\sin\beta} = n$, then prove that $(m^2 + n^2)\cos^2\beta = n^2$.
11. If $\frac{\cos\theta}{1 + \sin\theta} = \frac{1}{a}$, then prove that $\frac{a^2 - 1}{a^2 + 1} = \sin\theta$.

SECTION C

(4x5=20)

Answer **any 4** questions. Question No. **16** is **compulsory**.

12. If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$, then prove that $(x^2 y)^{\frac{2}{3}} - (xy^2)^{\frac{2}{3}} = 1$.
13. A lift in the 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 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. The angle of elevation of the top of a cell phone tower from the foot of a high apartment is 60° and the angle of depression of the foot of the tower from the top of the apartment is 30° . If the height of the apartment is 50m, find the height of the cell phone tower. According to radiations control norms, the minimum height of a cell phone tower should be 120m. State if the height of the above mentioned cell phone tower meets the radiation norms.
15. A pole 5m 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. ($\sqrt{3} = 1.732$)

16.If $\sin\theta(1 + \sin^2\theta) = \cos^2\theta$, then prove that $\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = 4$.

SECTION D

(2x8=16)

Answer **all** the questions.

17.Draw a tangent to the circle from the point P having radius 3.6cm, and the centre at O. Point P is at a distance 7.2 cm from the centre.

18.A bus is travelling at a uniform speed of 50km/hr. Draw the distance – time graph and hence find

- (i) The constant of variation
- (ii) How far will it travel in 90 minutes?
- (iii) The time required to cover a distance of 300 km from the graph.