TRIGONEMETRY
UNIT TEST

CLASS: 10   **MARKS:50**
SUB: MATHS   **TIME: 1.30 Hrs.**
Choose the correct answer: **7 x 1 = 7**

1. The value of $sin^2\theta + \frac{1}{1+tan^2\theta}$ is equal to

   (A) $tan^2\theta$ (B) 1   (C) $cot^2\theta$ (D) 0

2. If $(sin\alpha + cosec\alpha)^2 + (cos\alpha + sec\alpha)^2 = k + tan^2\alpha + cot^2\alpha$, then the value of 'k' is

   (A) 9   (B) 7   (C) 5   (D) 3

3. If $5x = sec\theta$ and $\frac{5}{y} = tan\theta$, then $x^2 - \frac{1}{y^2}$ is equal to

   (A) 25   (B) $\frac{1}{25}$ (C) 5   (D) 1

4. If $x = a\,tan\theta$ and $y = b\,sec\theta$ then

   (A) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ (B) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (C) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (D) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$.

5. $a\,cot\theta + b\,cosec\theta = p$ and $b\,cot\theta + a\,cosec\theta = q$ then $p^2 - q^2$ is equal to

   (A) $a^2 - b^2$ (B) $b^2 - a^2$ (C) $a^2 + b^2$ (D) b - a

6. 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) $\frac{b}{\sqrt{3}}$.

7. The angle of depression of the top and bottom of 20 m tall building from the top of a multi-storied building are 30° and 60° respectively. The height of the multi-storied building and the distance between two buildings (in metres) is

   (A) 20,$10\sqrt{3}$ (B) 30,$5\sqrt{3}$ (C) 20, 10   (D) 30, $10\sqrt{3}$.

II. Answer any FIVE Questions: (Q.No.14 is compulsory)   **5 x 2 = 10**

8. Prove that $\frac{sin\,A}{1+cos\,A} = \frac{1-cos\,A}{sin\,A}$

9. Prove the following identities: $sec^6\theta = tan^6\theta + 3tan^2\theta sec^2\theta + 1$.

10. Prove the following identities: $\frac{sin^3A+cos^3A}{sin\,A + cos\,A} + \frac{sin^3A - cos^3A}{sin\,A - cos\,A} = 2$.

11. A tower stands vertically on the ground. From a point on the ground, which is 48m 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.

12. 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.

13. 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.

14. 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.

III. Answer any FIVE Questions: (Q.No.21 is compulsory)   **5 x 5 = 25**

15. If $cos\,\theta + sin\,\theta = \sqrt{2}\,cos\,\theta$, then prove that $cos\,\theta - sin\theta = \sqrt{2}sin\theta$.

16. Prove that $\frac{sin\,A}{1 + cos\,A} + \frac{sin\,A}{1 - cos\,A} = 2cosec\,A$

17. If $\frac{cos\,\alpha}{cos\,\beta} = m$ and $\frac{cos\,\alpha}{sin\,\beta} = n$, then prove that $(m^2 + n^2)cos^2\beta = n^2$.

18. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships.

19. A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the men's eye when at a distance of 200 m from the

tower. After 10 seconds, the angle of depression become 45°. What is the approximate speed of boat (in km/hr), assuming that it is sailing in still water?

20. 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.

21. 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.

IV. Answer all the question: 1 x 8 = 8

22. Draw the two tangents from a point which 5 cm away from the centre of a circle of diameter 6cm. Also, measure the length of the tangents.   (OR)

A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below:

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

(i) Graph the above data and identify the type of variation.

(ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?

(iii) If the work has to be completed by 30 days, how many workers are required?