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TRIGONOMETRY
UNIT TEST

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

1. $\tan\theta\,\mathrm{cosec}^2\theta - \tan\theta$ is equal to

    (A) $\sec\theta$ (B) $cot^2\theta$ (C) $\sin\theta$ (D) $\cot\theta$.

2. If $\sin\theta + \cos\theta = a$ and $\sec\theta + \mathrm{cosec}\theta = b$, then the value of $b(a^2-1)$ is equal to

    (A) $2a$ (B) $3a$ (C) 0 (D) $2ab$

3. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to

    (A) $-\frac{3}{2}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $-\frac{2}{3}$.

4. $(1 + tan\theta + sec\theta)(1 + cot\theta - cosec\theta)$ is equal to

    (A) 0 (B) 1 (C) 2 (D) -1

5. If the ratio of the height of a a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure

    (A) 45º   (B) 30º   (C) 90º   (D) 60º.

6. A tower is 60 m heigh. Its shadow reduces by x metres when the angle of elevation of the sun increases from 30º to 45º then x is equal to

    (A) 41.92 m   (B) 43.92 m   (C) 43 m   (D) 45.6 m

7. Two persons are standing 'x' meters apart from each other and the height of the first persons is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shortest person (in metres) is

    (A) $\sqrt{2}x$ (B) $\frac{x}{2\sqrt{2}}$ (C) $\frac{x}{\sqrt{2}}$ (D) $2x$.

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

8. Prove that $\sec\theta - \cos\theta = \tan\theta\sin\theta$

9. Prove the following identities: (i) $\frac{1-tan^2\theta}{cot^2\theta-1} = tan^2\theta$

10. Prove the following identities:

    $(sin\,\theta + sec\,\theta)^2 + (cos\,\theta + \mathrm{cosec}\,\theta)^2 = 1 + (sec\,\theta + \mathrm{cosec}\,\theta)^2$.

11. A kite is flying at a height of 75m 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.

12. Calculate the size of $\angle BAC$ with $\angle B = 90°$, $\angle A = \theta°$ and BC=4cm. ($\tan 38.7° = 0.8011$, $\tan 69.4° = 2.6604$).

13. 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.

14. Prove the following identities: $\sqrt{\frac{1+sin\,\theta}{1-sin\,\theta}} = sec\,\theta + tan\,\theta$

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

15. If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$, then prove that $\left(x^2y\right)^{\frac{2}{3}} - \left(xy^2\right)^{\frac{2}{3}} = 1$.

16. If $\frac{cos\,\theta}{1+sin\,\theta} = \frac{1}{a}$, then prove that $\frac{a^2-1}{a^2+1} = sin\,\theta$.

17. From the point on the ground, the angle 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.

18.A statue 1.6 m tall stands on the top of a pedestal. From the point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle

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of elevation of the top of the pedestal is 40°. Find the height of the pedestal. (tan40° = 0.8391, $\sqrt{3}$ = 1.732).

19. 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.

20. 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.

21. 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 (i) the height of the lamp post. (ii) the distance between the height of the lamp post and the apartment. (iii) the distance between the lamp post and the apartment.

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

22. Construct a triangle similar to a given triangle LMN with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle LMN (scale factor $\frac{4}{5}$ < 1).   (OR)

The following table shows the data about the number of pipes and the time taken to till the same tank:

Number of Pipes (x)	2	3	6	9
Time taken (in min) (y)	45	30	15	10

Draw the graph for the above data and hence

(i) Find the time taken to fill the tank when five pipes are used

(ii) Find the number of pipes when the time is 9 minutes.