PRAGATHI...THE SCHOOL

Dakshina Bharatha Mahila Samaja Premises,
Whitefield Railway Station Road, Kadugodi, Bangalore - 560067

GRADE X	***Mathematics***	***Date : 02/12/2022***
Time Allowed: 1 Hrs	***U*NIT TEST**	***Max Marks: 30***

General Instructions :

1. This Question paper contains - **five sections** A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. **Section A** has 3 **MCQ's and 01** Assertion-Reason based questions of 1 mark each.
3. **Section B** has 1 **Very Short Answer (VSA)-type** questions of 2 marks each.
4. **Section C** has 2 **Short Answer (SA)-type** questions of 3 marks each.
5. **Section D** has 2 **Long Answer (LA)-type** questions of 5 marks each.
6. **Section E** has 2 **source based/case based/passage based/integrated units of assessment** (4 marks each) with sub parts.

SECTION A

(Multiple Choice Questions) **Each question carries 1 mark**

1. $\sqrt{(1-\cos^2\theta)\sec^2\theta} =$

   a) $\tan\theta$ b) $\cot\theta$ c) $\sin\theta$ d) $\cos\theta$

2. If tan A = ntan B and sin A = msin B, then $\cos^2 A$ =

   a) $\frac{m^2-1}{n^2-1}$ b) $\frac{m^2+1}{n^2-1}$ c) $\frac{m^2+1}{n^2+1}$ d) $\frac{m^2-1}{n^2+1}$

3. A contractor planned to install a slide for the children to play in a park. If he prefers to have a slide whose top is at a height of 1.5 m and is inclined at an angle of 30^0 to the ground, then the length of the slide would be

   a) $\sqrt{3}m$ b) $3m$ c) $1.5m$ d) $2\sqrt{3}m$

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of (A)
(b) Both A and R are true but R is not the correct explanation of (A)
(c) A is true but R is false. (d) A is false but R is true.

4. **Assertion (A):** The value of sinA is always less than 1.
   Reason (R): SinA is the product of sin and A

SECTION B

This section comprises of very short answer type-questions (VSA) of 2 marks each

5. If tan θ + sec θ = ℓ, then prove that $\sec\theta = \frac{l^2+1}{2l}$

OR

If $\tan\theta + \sin\theta = m$ & $\tan\theta - \sin\theta = n$, *show that* $m^2 - n^2 = 4\sqrt{mn}$

SECTION C

(This section comprises of short answer type questions (SA) of 3 marks each)

6. Prove that $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2\,\mathrm{cosec}\,A$

7. If tan (A + B) = $\sqrt{3}$ and tan (A – B) = $\frac{1}{\sqrt{3}}$ where 0 < A + B < 90°, A > B, find A and B.

Also calculate: tan A. sin (A + B) + cos A. tan (A – B)

OR

Prove that: (1 + cot A – cosec A) (1 + tan A + sec A) = 2

8. Evaluate $\frac{4\cot^2 60^0 + \sec^2 30^0 - 2\sin^2 45^0}{\sin^2 60^0 + \cos^2 45^0}$

SECTION D

(This section comprises of long answer-type questions (LA) of 5 marks each)

9. Prove that $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{1 - 2\cos^2 A}$

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

OR

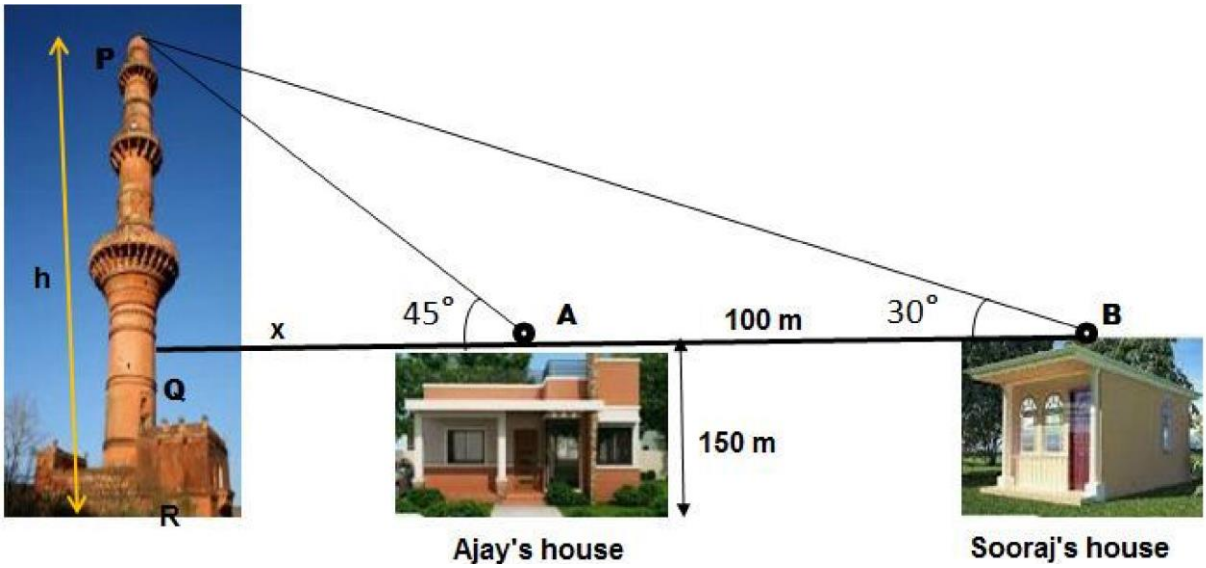
Prove that $\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$

SECTION E

(This section comprises of 1 case-study/passage-based questions of 4 marks each with two sub-parts. First two case study questions have three sub -parts (i), (ii), (iii) of marks 1, 1, 2 respectively. The third case study question has two sub-parts of 2 marks each.)

11. **Case Study -1 :**

The houses of Ajay and Sooraj are at 100 m distance and the height of their houses is the same as approx 150 m. One big tower was situated near their house. Once both friends decided to measure the height of the tower. They measure the angle of elevation of the top of the tower from the roof of their houses. The angle of elevation of ajay's house to the tower and sooraj's house to the tower are 45^o and 30^o respectively as shown in the figure.



i. Find the height of the tower.

ii. What is the distance between the tower and the house of Sooraj?

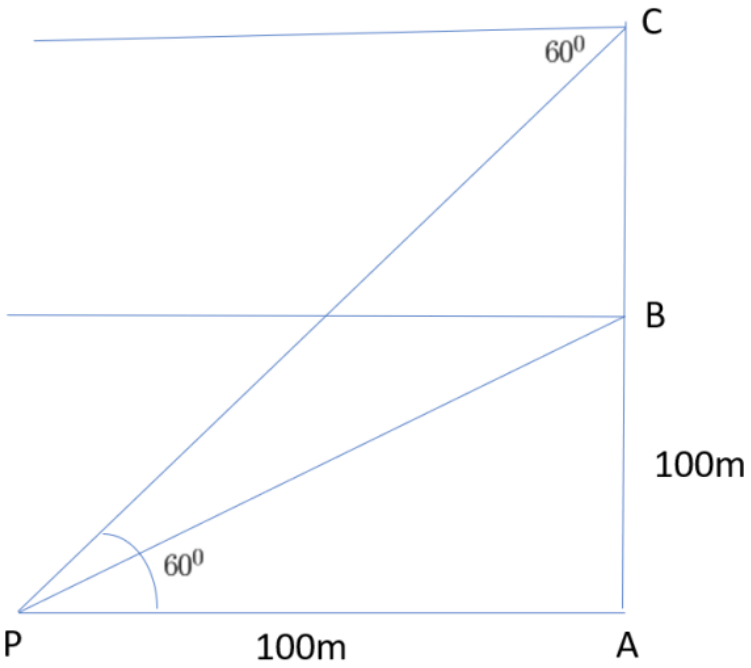
iii. Find the distance between top of the tower and top of Sooraj's house?

OR

Find the distance between top of tower and top of Ajay's house?

12. **Case Study – 2:**

A hot air balloon is rising vertically from a point A on the ground which is at distance of 100m from a car parked at a point P on the ground. Amar, who is riding the balloon, observes that it took him 15 seconds to reach a point B which he estimated to be equal to the horizontal distance of his starting point from the car parked at P .



i. Find the angle of depression from the balloon at a point B to the car at point P .

ii. Find the speed of the balloon?

iii. After certain time Amar observes that the angle of depression is 60^o.Find the vertical distance travelled by the balloon during this time.

OR

Find the total time taken by the balloon to reach the point C from ground?