



SUBJECT: MATHS
DATE : 23/11/24

PBMT - PAPER - 04
CH - 8 INTRODUCTION TO TRIGONOMETRY ,
CH - 9 APPLICATION OF TRIGONOMETRY

MAX. MARKS : 30
DURATION : 60 MIN

General Instruction:

This Question Paper has 5 Sections A-E.

1. **Section A** has 6 MCQs carrying 1 mark each.
2. **Section B** has 2 questions carrying 02 marks each.
3. **Section C** has 2 questions carrying 03 marks each.
4. **Section D** has 1 questions carrying 04 marks each.
5. **Section E** has 2 questions carrying 05 marks each .

Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. $\tan A =$

- (a) $\frac{\cos A}{\sqrt{1-\cos^2 A}}$ (b) $\frac{\sec A}{\sqrt{1-\sec^2 A}}$ (c) $\frac{\sin A}{\sqrt{1-\sin^2 A}}$ (d) $\frac{1}{\sqrt{1-\sin^2 A}}$

2. Given that $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is

- (a) 0° (b) 30° (c) 60° (d) 90°

3. The tops of two poles of heights 20m and 14 m are connected by a wire .If the wire makes an angle of 30° with the horizontal ,then the length of the wire is

- (a) 8 m (b) 10 m (c) 12 m (d) 14m

4. The angle of elevation of the top of a rock from the top and foot of 100 m high tower are respectively 30° and 45° .The height of the rock is

- (a) 50 m (b) 150 m (c) $50\sqrt{3}$ (d) $50(3 + \sqrt{3})$

5. The angle depression of a car ,standing on the ground ,from the top 75 m tower is 30° .The distance of the car from the base of the tower (in meters) is

- (a) $25\sqrt{3}$ (b) $50\sqrt{3}$ (c) $75\sqrt{3}$ (d) 150

6. If $\sin A + \sin^2 A = 1$,then the value of $(\cos^2 A + \cos^4 A)$ is

- (a) 1 (b) $\frac{1}{2}$ (c) 2 (d) 3

SECTION – B

Questions 7 to 8 carry 2 mark each.

7. $\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$.

or

Find the value of θ , if $\frac{\cos \theta}{1-\sin \theta} + \frac{\cos \theta}{1+\sin \theta} = 4$, $\theta \leq 90^\circ$.

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

SECTION – C

Questions 9 to 10 carry 3 mark each.

9. Find the value of $\tan \theta$, if $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$.

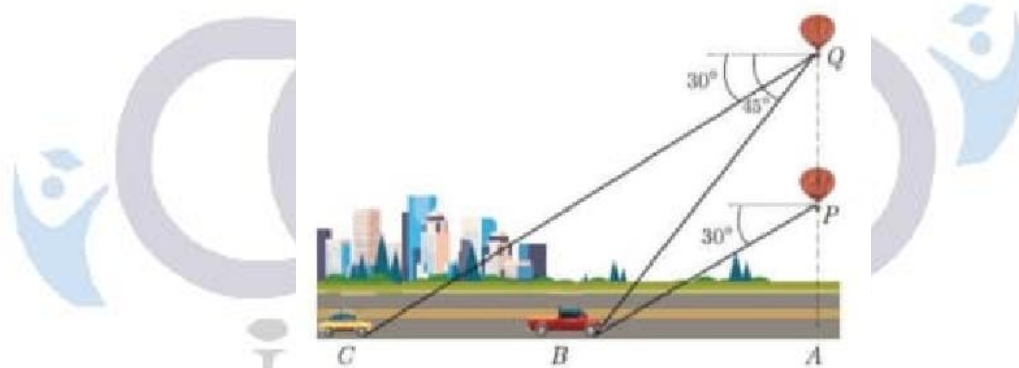
10. Prove $\frac{\cot A - \cos A}{\cot A + \cos A} = \sec^2 A + \tan^2 A - 2 \sec A \tan A$.

SECTION – D

Questions 11 carry 4 mark each.

11. A hot air balloon is a type of aircraft. It is lifted by heating the air inside the balloon, usually with fire. Hot air weighs less than the same volume of cold air (it is less dense), which means that hot air will rise up or float when there is cold air around it, just like a bubble of air in a pot of water. The greater the difference between the hot and the cold, the greater the difference in density, and the stronger the balloon will pull up.

Lakshman is riding on a hot air balloon. After reaching at height x at point P , he spots a lorry parked at B on the ground at an angle of depression of 30° . The balloon rises further by 50 metres at point Q and now he spots the same lorry at an angle of depression of 45° and a car parked at C at an angle of depression of 30° .



- (i) What is the relation between the height x of the balloon at point P and distance d between point A and B ? When balloon rises further 50 m, then what is the relation between new height y and d ?
- (ii) Find the distance between the lorry and the car.

SECTION – E

Questions 12 to 13 carry 5 mark each

12. A 7m long flagstaff is fixed on the top of a tower on the horizontal plane. From point on the ground, the angles of elevation of the top and bottom of the flagstaff are 45° and 30° respectively. Find the height of the tower. (Use $\sqrt{3} = 1.732$)

or

A bird is sitting on the top of a tree, which is 80m high. The angle of elevation of the bird, from a point on the ground, is 45° . The bird flies away from the point of observation horizontally and remains at a constant height. After 2 secs, the angle of elevation of the bird from the point of observation becomes 30° . Find the speed of the flying bird. (Use $\sqrt{3} = 1.732$)

13. If $\cos(A + B) = \sin(A - B) = \frac{1}{2}$, $0 < A + B < 90^\circ$ and $A > B$ then find the value of A and B .

End

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