Inverse Trigonometric Functions

Multiple Choice Questions :-

1. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then x =

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

2. If $\tan^{-1}(\cot \theta) = 2\theta$, then θ is equal to

   (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) None of these

3. $\cot(\frac{\pi}{4} - 2\cot^{-1} 3) =$

   (a) 7 (b) 6 (c) 5 (d) None of these

4. The principal value of $\tan^{-1}(\tan 3\pi/5)$ is

   (a) $2\pi/5$ (b) $-2\pi/5$ (c) $3\pi/5$ (d) $-3\pi/5$

5. $\sin[\pi/3 - \sin^{-1}(-½)]$ is equal to:

   (a) ½ (b) ⅓ (c) -1 (d) 1

6. The domain of $\sin^{-1}(2x)$ is

   (a) [0, 1] (b) [– 1, 1] (c) [-1/2, 1/2] (d) [–2, 2]

7. If $\sin^{-1} x + \sin^{-1} y = \pi/2$, then value of $\cos^{-1} x + \cos^{-1} y$ is

   (a) $\pi/2$ (b) π (c) 0 (d) $2\pi/3$

8. The domain of $y = \cos^{-1}(x^2 - 4)$ is

   (a) [3, 5] (b) [0, π] (c) $[-\sqrt{5}, -\sqrt{3}] \cap [-\sqrt{5}, \sqrt{3}]$ (d) $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$

9. The value of the expression $\sin[\cot^{-1}(\cos(\tan^{-1} 1))]$ is

   (a) 0 (b) 1 (c) $1/\sqrt{3}$ (d) $\sqrt{2}/\sqrt{3}$

10. Which of the following is the principal value branch of $\cos^{-1} x$?

    (a) $[-\pi/2, \pi/2]$ (b) $(0, \pi)$ (c) $[0, \pi]$ (d) $(0, \pi) - \{\pi/2\}$

ANSWERS:

1	2	3	4	5	6	7	8	9	10
(b) $\frac{\sqrt{3}}{2}$	(c) $\frac{\pi}{6}$	(a) 7	(b) - $2\pi/5$	(d) 1	(c) [-1/2, 1/2]	(a) $\pi/2$	(d)	(d) $\sqrt{2}/\sqrt{3}$	(c) [0, π]

Case Study Based Questions :-

1. Read the following text and answer the following questions on the basis of the same:

In the school project Sheetal was asked to construct a triangle and name it as ABC. Two angles A and B were given to be equal to $\tan^{-1}(½)$ and $\tan^{-1}(⅓)$ respectively.

a) The value of sin A is _____.

A. ½ B. ⅓ C. $1/\sqrt{5}$ D. $2/\sqrt{5}$

b) The third angle, $\angle C =$ _____.

A. $\pi/4$ B. $\pi/2$ C. $\pi/3$ D. $3\pi/4$

c) $\cos(A + B + C)$

A. 1 B. 0 C. – 1 D. 1/2

d) If $A = \sin^{-1} x$, then the value of x is

A. $1/\sqrt{10}$ B. $3/\sqrt{10}$ C. $1/\sqrt{5}$ D. $2/\sqrt{5}$

e) If $A = \cos^{-1} x$, then the value of x is

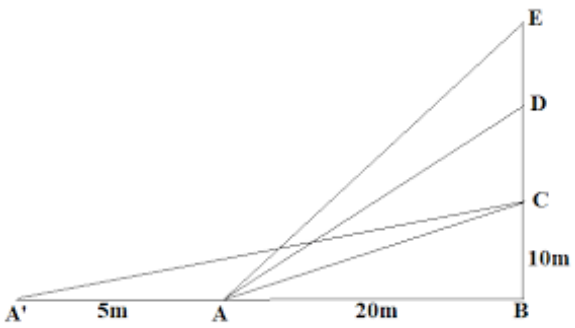
A. $1/\sqrt{10}$ B. $3/\sqrt{10}$ C. $1/\sqrt{5}$ D. $2/\sqrt{5}$

ANSWERS:

a)	b)	c)	d)	e)
$1/\sqrt{5}$	$3\pi/4$	– 1	$1/\sqrt{5}$	$3/\sqrt{10}$

2. The Government of India is planning to fix a hoarding board at the face of a building on the road of a busy market for awareness on COVID-19 protocol. Ram, Robert and Rahim are the three engineers who are working on this project. 'A' is considered to be a person viewing the hoarding board 20 metres away from the building, standing at the edge of a pathway nearby, Ram Robert and Rahim suggested to the film to place the hoarding board at three different locations namely C, D and E. 'C' is at the height of 10 metres from the ground level. For the viewer 'A', the angle of elevation of 'D' is double the angle of elevation of 'C'. The angle of elevation of 'E' is triple the angle of elevation of 'C' for the same viewer.

Look at the figure given and based on the above information answer the following:



(i) Measure of $\angle CAB =$

(a) $\tan^{-1}(2)$ (b) $\tan^{-1}(1/2)$ (c) $\tan^{-1}(1)$ (d) $\tan^{-1}(3)$

(ii) Measure of $\angle DAB =$

(a) $\tan^{-1}(3/4)$ (b) $\tan^{-1}(3)$ (c) $\tan^{-1}(4/3)$ (d) $\tan^{-1}(4)$

(iii) Measure of $\angle EAB$

(a) $\tan^{-1}(11)$ (b) $\tan^{-1}(3)$ (c) $\tan^{-1}(2/11)$ (d) $\tan^{-1}(11/2)$

(iv) A' is another viewer standing on the same line of observation across the road. If the width of the road is 5 meters, then the difference between $\angle CAB$ and $\angle CA'B$ is

(a) $\tan^{-1}(1/12)$ (b) $\tan^{-1}(1/8)$ (c) $\tan^{-1}(2/5)$ (d) $\tan^{-1}(11/21)$

Answer:

(i) b (ii) c (iii) d (iv) a