Remesh's
Mathematics

[XI MATHEMATICS QUESTION BANK]

CHAPTER 3

TRIGONOMETRY

JANUARY 2022

1. a) Convert $\frac{2\pi}{3}$ radians into degree measure. (1)

    b) If $sin\, x = \frac{3}{5}$, x lies in the second quadrant,
       then find the values of the trigonometric
       functions cos x, sec x and tan x. (3)

2. Prove that

    a) $\cos(x + y) + \cos(x - y) = 2cosxcosy$ (2)

    b) $\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2}cosx$ (1)

    c) $\sin^2\frac{\pi}{6} + \cos^2\frac{\pi}{3} - \tan^2\frac{\pi}{4} = -\frac{1}{2}$ (3)

SEPTEMBER 2021

3. i. If $cosx = -\frac{1}{2}$, x lies in 3rd quadrant, find the
       values of $sinx$ and $tanx$. (2)

    ii. Prove that $\tan^2\frac{\pi}{6} + \cos^2\frac{\pi}{3} = \frac{1}{2}$ (2)

4. i) Evaluate: $sin75^0$ (3)

    ii) Prove that $\frac{sin5x+sin3x}{cos5x+cos3x} = tan4x$ (3)

DECEMBER 2020

5. i. Which among the following is the value of
       $\sin^2\frac{\pi}{6} + \tan^2\frac{\pi}{4} + \cos^2\frac{\pi}{6}$? (1)
       A) 0   B) 2   C) $\frac{1}{2}$ D) $\frac{1}{\sqrt{3}}$

    ii. Prove that $\frac{sinx-siny}{cosx+cosy} = tan\frac{x-y}{2}$ (2)

6. i. Find the general solution of the trigonometric
       equation $sinx = -\frac{1}{2}$ (2)

    ii. Find the value of cos15 (2)

    iii. In triangle ABC,
        $\angle A = 30^0, AB = 3\sqrt{2}\ cm, BC = 3cm$, find
        $\angle B, \angle C$ and length of side AC. (2)
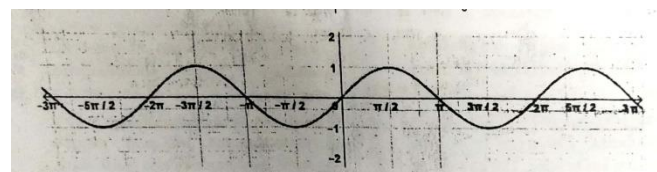
MARCH 2020

7. Find the principal and general solutions of
    $cosecx = -2 = $ ……….. (1)

8. a) If $\tan x = -\frac{5}{12}, x$ lies in second quadrant.
       Find all trigonometric functions. (2)

    b) Without using triangle, find the value of
       $\frac{\sin x + \cos x}{\sin x - \cos x}$, $\tan x = \frac{3}{4}$. (2)

    c) Prove that $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x}$. (2)

IMPROVEMENT 2019

9. a) If the measurements of angles of a triangle are
       in the ratio 4:2:3, then express the angles
       i) in degree measure
       ii) in radian measure. (2)

    b) $\tan\left(2019\pi - x\right) = $ ……….. (1)

10. a) Prove that
       $\sin^2 8x - \sin^2 4x = \sin 12x \sin 4x$ (2)

    b) For any ΔABC, prove that

       $\frac{a+b}{c} = \frac{\cos\left(\dfrac{A-B}{2}\right)}{\sin\dfrac{C}{2}}$ (2)

    c) Find the general and principal solutions of
       the trigonometric equation $\sin x = \frac{\sqrt{3}}{2}$
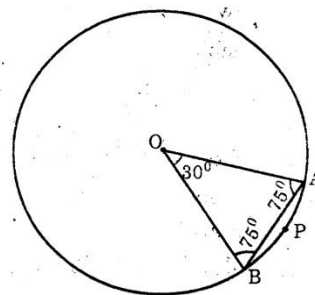
MARCH 2019

11. Find the solution of the equation
    $Sinx + Sin3x + Sin5x = 0$ (3)

12. Consider the graph of the function f(x). (1)

    Identify the function f(x) = ………

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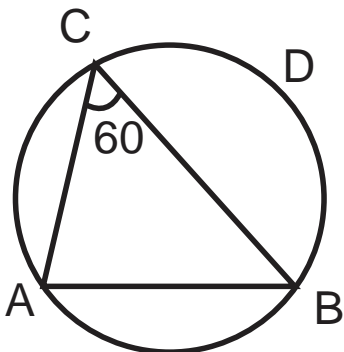
i) $f(x) = \sin x$

ii) $f(x) = \cos x$

iii) $f(x) = \tan x$

iv) $f(x) = \cos ecx$

13. a) Find $\sin 75°$ (2)

   b) The figure shows ΔABC with side
      $AC = 4\sqrt{2}$ units inscribed in a circle of
      radius 4 units. The length of the arc BDC
      is $\dfrac{10\pi}{3}$ units.

   i) Write $\angle A$ in degree measure.   (2)

   ii) Find the length of the side AB
       and BC.   (2)

IMPROVEMENT 2018

14. a) Prove that $\dfrac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = -\dfrac{\sin 2x}{\cos 10x}$ (2)

   b) Evaluate: $\lim\limits_{x \to 0} \dfrac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x}$ (1)

      [Chapter 3 and 13 combined question]

15. a) Find the value of $\sin 75^0$.   (2)

   b) In the figure, $\angle AOB = 30^0$ and
      radius of the circle is 2 units. Find
      the length of chord AB.   (2)

   c) Find the length of chord AB.   (2)

MARCH 2018

16. Solve $\sin 2x - \sin 4x + \sin 6x = 0$ (2)

17. In a triangle ABC, prove that

    $\tan\left(\dfrac{B-C}{2}\right) = \dfrac{b-c}{b+c}\cot\dfrac{A}{2}$ (3)

18. a) The maximum value of the function

    $f(x) = \sin x$ is ………….   (1)

    i) 1   ii) $\dfrac{\sqrt{3}}{2}$ iii) $\dfrac{1}{2}$ iv) 2

   b) Prove that $(\sin x + \cos x)^2 = 1 + \sin 2x$ (1)

   c) Find the maximum value of $\sin x + \cos x$.   (1)

IMPROVEMENT 2017

19. a) $\sin 765^0 = $ ....   (1)

   b) Prove that: $\dfrac{Cos7x + Cos5x}{Sin7x - Sin5x} = Cot\, x$ (2)

   c) Prove that $Cos4x = 1 - 8Sin^2 x\, Cos^2 x$ (3)

                        OR

   a) $Sin(\pi - x) = $ ....   (1)

   b) Prove that $\dfrac{Sin5x + Sin3x}{Cos5x + Cos3x} = Tan\, 4x$ (2)

   c) In any triangle ABC, prove that

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$$\frac{SinA}{a} = \frac{SinB}{b} = \frac{SinC}{c} \qquad (3)$$

MARCH 2017

20. a) $Sin\,405^0 = ...\,.....$

　　i) $\frac{1}{2}$　　　　　　　ii) $\frac{1}{\sqrt{2}}$

　　iii) $\frac{\sqrt{3}}{2}$　　　　　iv) 1　　　(1)

　b) If $Sinx = \frac{3}{5}, x$ lies in the second quadrant.
　　Find the values $Cosx,\ Secx,\ Tanx$
　　and $Cotx$　　　(2)

　c) Solve: $Sin2x - Sin4x + Sin6x = 0$　　(3)

OR

　a) $\frac{7\pi}{6}$ radian =……… degree
　　i) 210　　　　　ii) 300
　　iii) 240　　　　iv) 120　　　(1)

　b) Find the value of $Tan\,75^0$　　(2)

　c) In any triangle ABC, prove that
　　$aSin(B - C) + bSin(C - A) + cSin(A - B) = 0$　　(3)

IMPROVEMENT 2016

21. a) $40^0\,20' = ...$radians

　　i) $\frac{112\pi}{540}$　　　　ii) $\frac{211\pi}{540}$

　　iii) $\frac{122\pi}{540}$　　　iv) $\frac{121\pi}{540}$　　(1)

　b) Prove that:

　　$3\,sin\left(\frac{\pi}{6}\right)sec\left(\frac{\pi}{3}\right) - 4sin\left(\frac{5\pi}{6}\right)cot\left(\frac{\pi}{4}\right) = 1$　　(2)

　c) Solve: $Sin2x - Sin4x + Sin6x = 0$　　(3)

MARCH 2016

22. a) The degree measure of $\frac{7\pi}{6}$ radians is
　　…….
　　i) 120°　　　　　ii) 102°
　　iii) 201°　　　　iv) 210°　　　(1)

　b) Prove that $\frac{cos7x + cos5x}{sin7x - sin5x} = cotx$　　(2)

　c) A lamp post is situated at the middle point M of the side AC of a triangular plot ABC with $BC = 7m\ CA = 8m, AB = 9m$. Lamp post subtends an angle 15° at the point B. Determine the height of the lamp post.　　(3)

IMPROVEMENT 2015

23. a) Which of the following is equal to 520^0 ?

　　i) $\frac{26\pi}{9}$　　　　ii) 9π

　　iii) 26π　　　　iv) $\frac{9\pi}{26}$　　(1)

　b) Solve $\sin 2x - \sin 4x + \sin 6x = 0$　　(2)

　c) In any triangle ABC, prove that

　　$\tan\left(\frac{B - C}{2}\right) = \frac{b - c}{b + c}\cot\frac{A}{2}$　　(3)

MARCH 2015

24. a) Which one of the following values of $\sin x$ is incorrect?

　　i) 0　　　　　ii) $\frac{1}{2}$

　　iii) 3　　　　iv) 1　　　(1)

　b) Prove that
　　$\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2}\cos x$　　(2)

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c) A tree breaks due to a storm and the broken part bends so that the top of the tree touches the ground making an angle of 30^0 with it. The distance between the foot of the tree to the point where the top touches the ground is 8m. Find the height of the tree.   (3)

OR

a) $\sin 225^0 = \ldots\ldots\ldots$

   i) $\dfrac{1}{\sqrt{2}}$ ii) $\dfrac{\sqrt{3}}{2}$

   iii) $-\dfrac{1}{\sqrt{2}}$ iv) $\dfrac{1}{2}$ (1)

b) Find the principal and general solution of

   $\sin x = -\dfrac{\sqrt{3}}{2}$ (2)

c) Prove that $\tan\left(\dfrac{A-B}{2}\right) = \dfrac{a-b}{a+b}\cot\dfrac{C}{2}$ (3)

IMPROVEMENT 2014

25. a) $\dfrac{2\pi}{3}$ radians = $\ldots\ldots\ldots$degree.   (1)

    b) $cos(2\pi - x) = \ldots\ldots$ (1)

    c) Find the general solution of

       $Sin2x - Sin4x + Sin6x = 0$.   (4)

MARCH 2014

26. a) The value of $\sin(\pi - x) = \ldots\ldots$ (1)

    b) Find the principal and general solution of the

       equation $\sin x = \dfrac{\sqrt{3}}{2}$ (2)

    c) Prove that $\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$ (3)

IMPROVEMENT 2013

27. Show that

    a) $\tan 15^0 = 2 - \sqrt{3}$ (2)

b) $\tan 15^0 + \cot 15^0 = 4$ (1)

28. Consider the trigonometric equation $\tan x = \sqrt{3}$.

    a) Write the general solution.   (2)
    b) Write the principal solutions.   (1)

MARCH 2013

29. Prove that $\dfrac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$ (3)

30. Prove that $\dfrac{\tan\left(\dfrac{\pi}{4} + x\right)}{\tan\left(\dfrac{\pi}{4} - x\right)} = \left(\dfrac{1 + \tan x}{1 - \tan x}\right)^2$ (2)

IMPROVEMENT 2012

31. Show that

    $\tan x \tan 2x \tan 3x = \tan 3x - \tan 2x - \tan x$ (3)

32. Solve: $\sin 2x - \sin 4x + \sin 6x = 0$ (3)

MARCH 2012

33. a) Evaluate $\tan\left(\dfrac{13\pi}{6}\right)$ (1)

    b) If $\tan x = \dfrac{1}{2}$ and x is in the third quadrant, find $\sin x$ and $\cos x$.   (2)

34. Prove that $\dfrac{\cos 3x + \cos 7x - \cos 2x}{\sin 7x - \sin 3x - \sin 2x} = \cot 2x$ (3)

IMPROVEMENT 2011

35. If x is in the third quadrant, then

    a) Choose the possible values of $\csc x$ from the bracket.

       $\left[\dfrac{-3}{5}, \dfrac{3}{5}, \dfrac{5}{3}, \dfrac{-5}{3}\right]$ (1)

    b) Evaluate $\tan x \sec x$ for the x in part (a).   (2)

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36. Find the general solution of
    $\sin 6x - \sin 4x + \sin 2x = 0$ (3)

MARCH 2011

37. i)   Find the value of $sin\left(\dfrac{31\pi}{3}\right)$ (1)

   ii)   Find the principal and general solutions of the

      equation $\cos x = -\dfrac{\sqrt{3}}{2}$ (2)

   iii)   Show that

$(cosx + cosy)^2 + (sinx + siny)^2 = 4cos^2\left(\dfrac{x-y}{2}\right)$ (3)

IMPROVEMENT 2010

38. a)   Expand $\cos(x+y)$ and hence prove
     $\cos 2x = 1 - 2\sin 2x$.   (1)
   b)   Solve the equation $\tan^2\theta + \cot^2\theta = 2$ (2)

39. Show that

$\dfrac{\cos 8A.\cos 5A - \cos 12A.\cos 9A}{Sin8A.\cos 5A + \cos 12A.\sin 9A} = \tan 4A$ (3)

MARCH 2010

40. i)   Find the degree measure corresponding to

     $\dfrac{11}{14}$ radians $\left(Use\,\pi = \dfrac{22}{7}\right)$ (1)

   ii)   If $Cosx = -\dfrac{1}{2}$, x lies in the third quadrant,

      find $sin\,x$ and $tan\,x$ (2)

41. Prove that $\dfrac{sin5x + sin3x}{cos5x + cos3x} = tan4x$ (3)

IMPROVEMENT 2009

42. i)   Convert $\dfrac{31}{3}\pi$ radian in to degree

     measure.   (1)

   ii)   Find the value of $\sin\dfrac{31}{3}\pi$ (1)

   iii)   Find the general solution of the equation

      $\sin x = \dfrac{-\sqrt{3}}{2}$.   (2)

43. Prove that $\dfrac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$ (4)

MARCH 2009

44. a)   Convert $20^0 40'$ into radian measure.   (1)

   b)   If $\sin x = \dfrac{12}{13}$ and x is an acute angle, find

      the value of $\cos 2x$.   (1)

   c)   Show that:

     $sin(40^0 + x)cos(10^0 + x) - cos(40^0 + x)\times$

     $sin(10^0 + x) = \dfrac{1}{2}$ (2)

45. If $x + y = \dfrac{\pi}{4}$, then prove that

$(1 + \tan x)(1 + \tan y) = 2$ and hence

deduce $Tan\dfrac{\pi}{8}$.   (4)

MARCH 2008

46. i)   Prove that $\dfrac{sinx}{1 + cosx} = tan\dfrac{x}{2}$ (2)

   ii)   Find the domain and range of

      $f(x) = Cos\,2x.$ (2)

47. i)   Calculate $cos75^0\ and\ cos15^0$ using the

      values of $cos45$ and $cos30$ (2)

   ii)   Draw the graph of $f(x) = sin2x$ (3)