MUDIVILI LEARNING CENTRE

REVISION 3,4 &5

12th Standard

Maths

TWO MARKS 31 x 2 = 62

1) Construct a cubic equation with roots 1,2, and 3
2) A 12 metre tall tree was broken into two parts. It was found that the height of the part which was left standing was the cube root of the length of the part that was cut away. Formulate this into a mathematical problem to find the height of the part which was cut away.
3) Find a polynomial equation of minimum degree with rational coefficients, having $2+\sqrt{3}i$ as a root.
4) Solve the equation : $x^4-14x^2+45=0$
5) Discuss the nature of the roots of the following polynomials:
   $x^{2018}+1947x^{1950}+15x^8+26x^6+2019$
6) Discuss the maximum possible number of positive and negative roots of the polynomial equation $9x^9-4x^8+4x^7-3x^6+2x^5+x^3+7x^2+7x+2=0$
7) Find the principal value of $\sin^{-1}\left(-\frac{1}{2}\right)$ (in radians and degrees).
8) Find the principal value of $\sin^{-1}(2)$, if it exists.
9) Find all the values of x such that
   $-10\pi \leq x \leq 10\pi$ and sin x=0
10) Find the period and amplitude of
    y=sin 7x
11) Find (i) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$
    ii) $\cos^{-1}\left(cos\left(-\frac{\pi}{3}\right)\right)$
    iii) $\cos^{-1}\left(cos\left(-\frac{7\pi}{6}\right)\right)$
12) Find the principal value of $\cos\text{-}1\left(\frac{1}{2}\right)$.
13) Find the value of
    $2cos^{-1}\left(\frac{1}{2}\right)+sin^{-1}\left(\frac{1}{2}\right)$
14) Find the value of
    $tan(tan^{-1}(\frac{7\pi}{4}))$
15) Find the value of $\sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$
16) Find the principal value of
    $\sec^{-1}(\frac{2}{\sqrt{3}})$
17) Find the value of
    $tan^{-1}\left(\sqrt{3}\right)-sec^{-1}(-2)$
18) Simplify
    $cos^{-1}\left(cos\left(\frac{13\pi}{3}\right)\right)$
19) Find all the values of x such that
    $-8\pi \leq x \leq -8\pi$ and sin x=-1
20) Find the value of
    $cos^{-1}\left(\frac{1}{2}\right)+sin^{-1}(-1)$
21) Find the value of
    $\tan^{-1}(tan(-\frac{\pi}{6}))$
22) Find the value of
    $\tan(\tan^{-1}(-0.2021))$.
23) Find the principal value of
    $Sin^{-1}\left(sin\left(\frac{5\pi}{6}\right)\right)$

24) Find the general equation of a circle with centre(-3,-4) and radius 3 units.
25) Find the general equation of the circle whose diameter is the line segment joining the points (−4,−2)and (1,1).
26) Find the centre and radius of the circle$3x^2+(a+1)y^2+6x-9y+a+4=0$.
27) Find the equation of the circle with centre (2,-1) and passing through the point (3,6) in standard form.
28) Obtain the equation of the circle for which (3,4) and (2,-7) are the ends of a diameter.
29) If $y=2\sqrt{2}x+c$ is a tangent to the circle$x^2+y^2=16$, find the value of c.
30) Find the length of Latus rectum of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$
31) Find the equation of the hyperbola with vertices (0,±4) and foci(0,±6).

THREE MARKS 24 x 3 = 72

32) If α and β are the roots of the quadratic equation $2x^2-7x+13=0$, construct a quadratic equation whose roots are α^2 and β^2.
33) If the sides of a cubic box are increased by 1, 2, 3 units respectively to form a cuboid, then the volume is increased by 52 cubic units. Find the volume of the cuboid.
34) If p and q are the roots of the equation $lx^2+nx+n=0$, show that $\sqrt{\frac{p}{q}}+\sqrt{\frac{q}{p}}+\sqrt{\frac{n}{l}}=0$.
35) Solve the equation $2x^3+11x^2-9x-18=0$.
36) Solve the cubic equation : $2x^3-x^2-18x+9=0$ if sum of two of its roots vanishes.
37) Solve the cubic equations:
$2x^3 - 9x^2 + 10x = 3$
38) For what value of x , the inequality $\frac{\pi}{2}<cos^{-1}(3x-1)<\pi$ holds?
39) Find the value of
$cos\left(cos^{-1}\left(\frac{4}{5}\right)+sin^{-1}\left(\frac{4}{5}\right)\right)$
40) Find the domain of the following functions :
$tan^{-1}(\sqrt{9-x^2})$
41) Find the value of
$sin\left(tan^{-1}\left(\frac{1}{2}\right)-cos^{-1}\left(\frac{4}{5}\right)\right)$
42) Find the value of
$sin^{-1}(-1)+cos^{-1}\left(\frac{1}{2}\right)+cot^{-1}(2)$
43) Find the value of
$cot^{-1}(1)+sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)-sec^{-1}(-\sqrt{2})$
44) The line 3x+4y−12 = 0 meets the coordinate axes at A and B . Find the equation of the circle drawn on AB as diameter.
45) Find the equation of circles that touch both the axes and pass through (-4,-2) in general form.
46) Find the equation of the circle with centre (2,3) and passing through the intersection of the lines 3x−2y−1=0and 4x+y−27=0.
47) A circle of area 9π square units has two of its diameters along the lines x+y=5 and x−y=1. Find the equation of the circle.
48) Find the equation of the tangent and normal to the circle $x^2+y^2-6x+6y-8=0$ at (2,2) .
49) Determine whether the points(-2,1),(0,0) and (-4,-3) lie outside, on or inside the circle $x^2+y^2-5x+2y-5=0$.
50) If the equation$3x^2+(3-p)xy+qy^2-2px=8pq$ represents a circle, find p and q . Also determine the centre and radius of the circle
51) Find the length of Latus rectum of the parabola $y^2 = 4ax$.
52) Find the equation of the ellipse with foci (±2,0) , vertices (±3,0) .
53) Find the equations of the tangent and normal to hyperbola $12x^2-9y^2=108$ at $\theta=\frac{\pi}{3}$ (Hint: use parametric form)
54) Prove that the point of intersection of the tangents at ' t_1 ' and ' t_2 'on the parabola $y^2 = 4ax$ is $[at_1t_2, a(t_1+t_2)]$.
55) The maximum and minimum distances of the Earth from the Sun respectively are 152×10^6 km and 94.5×10^6 km. The Sun is at one focus of the elliptical orbit. Find the distance from the Sun to the other focus.

FIVE MARKS 26 x 5 = 130

56) Solve the equation $3x^3 - 16x^2 + 23x - 6 = 0$ if the product of two roots is 1.

57) Solve the equation $x^3-9x^2+14x+24=0$ if it is given that two of its roots are in the ratio 3:2.

58) If 2+i and $3-\sqrt{2}$ are roots of the equation $x^6-13x^5+62x^4-126x^3+65x^2+127x-140=0$, find all roots.

59) Solve the equation $9x-36x^2+44x-16=0$ if the roots form an arithmetic progression.

60) Determine k and solve the equation $2x^3-6x^2+3x+k=0$ if one of its roots is twice the sum of the other two roots.

61) Find all zeros of the polynomial $x^6-3x^5-5x^4+22x^3-39x^2-39x+135$, if it is known that 1+2i and $\sqrt{3}$ are two of its zeros.

62) Solve the following equation: $x^4-10x^3+26x^2-10x+1=0$

63) Solve the equations:
$6x^4-35x^3+62x^2-35x+6=0$

64) Solve the equation $6x^4-5x^3-38x^2-5x+6=0$ if it is known that $\frac{1}{3}$ is a solution.

65) Find the domain of $\sin^{-1}(2-3x^2)$

66) Find the domain of the following
$f(x) = sin^{-1}\left(\frac{x^2+1}{2x}\right)$

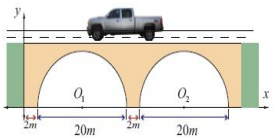
67) Find the value of $\sin^{-1}\left(sin\frac{5\pi}{9}cos\frac{\pi}{9} + cos\frac{5\pi}{9}sin\frac{\pi}{9}\right)$.

68) Find the domain of
f(x)=sin-1 $\left(\frac{|x|-2}{3}\right) + cos^{-}1\left(\frac{1-|x|}{4}\right)$

69) Evaluate $sin\left[sin^{-1}\left(\frac{3}{5}\right) + sec^{-1}\left(\frac{5}{4}\right)\right]$

70) Find the equation of the circle passing through the points(1,1), (2,-1) , and(3,2) .

71) A road bridge over an irrigation canal have two semi circular vents each with a span of 20m and the supporting pillars of width 2m. Use Fig.5.16 to write the equations that model the arches.



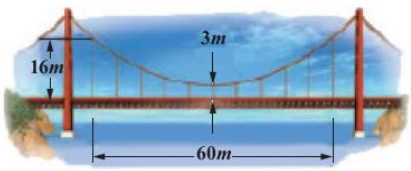
72) For the ellipse $4x^2+y^2+24x-2y+21 = 0$, find the centre, vertices, and the foci. Also prove that the length of latus rectum is 2 .

73) Show that the linex−y+4=0 is a tangent to the ellipse $x^2+3y^2=12$. Also find the coordinates of the point of contact.

74) A bridge has a parabolic arch that is 10m high in the centre and 30m wide at the bottom. Find the height of the arch 6m from the centre, on either sides.

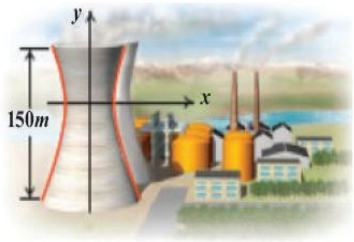
75) A tunnel through a mountain for a four lane highway is to have a elliptical opening. The total width of the highway (not the opening) is to be 16m, and the height at the edge of the road must be sufficient for a truck 4m high to clear if the highest point of the opening is to be 5m approximately . How wide must the opening be?

76) Parabolic cable of a 60m portion of the roadbed of a suspension bridge are positioned as shown below. Vertical Cables are to be spaced every 6m along this portion of the roadbed. Calculate the lengths of first two of these vertical cables from the vertex.



77) Cross section of a Nuclear cooling tower is in the shape of a hyperbola with equation $\frac{x^2}{30^2} - \frac{y^2}{44^2} = 1$ The tower is 150m tall and the distance from the top of the tower to the centre of the hyperbola is half the distance from the

base of the tower to the centre of the hyperbola. Find the diameter of the top and base of the tower.



78) A rod of length 1 2 . m moves with its ends always touching the coordinate axes. The locus of a point P on the rod, which is 0 3 . m from the end in contact with x -axis is an ellipse. Find the eccentricity.

79) Assume that water issuing from the end of a horizontal pipe, 7 5 . m above the ground, describes a parabolic path. The vertex of the parabolic path is at the end of the pipe. At a position 2 5 . m below the line of the pipe, the flow of water has curved outward 3m beyond the vertical line through the end of the pipe. How far beyond this vertical line will the water strike the ground?

80) On lighting a rocket cracker it gets projected in a parabolic path and reaches a maximum height of 4m when it is 6m away from the point of projection. Finally it reaches the ground 12m away from the starting point. Find the angle of projection.

81) Find the vertex, focus, equation of directrix and length of the latus rectum of the following: $y^2-4y-8x+12=0$

****