25 YEARS PAST PAPERS

XI−Mathematics

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XI MATHEMATICS

25 YEARS PAST PAPERS

CHAPTER # 01 SETS

1991

Q. Let U = {0, 1, 2, 3} , A = {0, 1} , B = {1, 2} , C = {2, 3}.
Prove that: A x (BUC) = (AxB) U (AxC)

1992

Q. If A = {2, 3}, B = {3, 4} and C = {4, 5} prove that A x (B∩C) = (AxB) ∩ (A x C).

1993

None

1994

Q. If U = {1, 2, ……. 6} , A = {1, 2, 3}, B = {1, 3, 5}
and C = {2, 4, 6}, find (A – C) and verify that:
A ∩ B ⊂ A ⊂ A U B

1995

Q. State De Morgan's law and verify it when A={3,4}, B={3,4} and U={1,2,3,4,5}

1996

None

1997

Q. Verify the property A x (B U C) = (A x B) U (A x C) in the following sets:
A = {a, b} , B = {b, c} C = {c, d}

1998

Q. Let A = {0, 2, 4}, B = {1, 2} and C = {3, 4} then prove that
A x (B U C) = (A x B) U (A x C)

1999

Q. Let U = {1, 2, 3, 4, 5, 6}; A = {1, 2, 3, 4} , B = {1, 3, 4, 5}
Show that (A ∩ B)′ = A′ U B′

2000

Q. Let U = {2, 3, 4, 5, 6}, A = {2, 3} , B = {3, 4}, C = {5, 6}.
Show that (B – C)′ = B′

2001

Q. If U = {1, 2, 3, 4, 5, 6} and A = {2, 3}, B = {3, 4}, C = {4, 5};
Find (A x B) ∩ (A x C)

2002

Q. State De Morgan's law and verify it when A={2,4}, B={3,4} and U={1,2,3,4,5}

2003

Q. If A = {2, 3}, B = {3, 4} , C = {c, f} and U = {2, 3, 4, c, f}, find
(A x B) U (A x C) and B′ – A′

2004

Q. If A = {1, 2, 4, }, B = {2, 3, 4} , U = {1, 2, 3, 4, 5} find (A U B)′ and (A ∩ A′)′.

2005

Q. If A and B are the subsets of the universal set U, then prove that $A \cup B = A \cup (A' \cap B)$.

2006

Q. If A and B are the subsets of a set U, then prove that $A \cup B = A \cup (A' \cap B)$

2007

Q. If U = {a,b,c,d,e} , A = {a,b,c} , B = {b,c,d}; find $(A \cap B')'$.

2008

Q. If A = {2,3}, C = {4,5}, find A x (B ∪ C)

2009

Q. If A= {2,3}, B={1,2} then A-B = ___________.

a. {1,1} b. {0,3} c. {3} d. {2}

2010

None

2011

Q. If A = {0,1}, B={1,2} and C ={2,3} then A x (B ∩ C) = _________

a. Ø b. {(1,3),(0,1)} c. {(0,2),(1,2)} d. {(2,3),(1,1)}

2012

None

2013

None

2014

None

CHAPTER # 02 REAL AND COMPLEX NUMBER SYSTEMS

1991

Q. Express $x^2 + y^2 = 9$ in terms of conjugate co-ordinates.

Q. Solve the complex equation $(x + 3_1)^2 = 2yi$

1992

Q. Simplify (x, 3y) . (2x, -y)

Q. Show that $z = 1 \pm i$ satisfies the equation:

$$z^2 - 2z + 2 = 0$$

1993

Q. If z_1 and z_2 are two complex numbers then show that $|z_1 z_2| = |z_1| |z_2|$.

1994

Q. If $Z_1 = 1 = i$ and $Z_2 = 3 + 2i$, evaluate: (i) $(\overline{z})^2$ (ii) $\frac{Z_1}{Z_2}$

1995

Q. Show that $(1 - i)^4$ is a real number

Q. Find the additive and multiplicative inverse of (1,-3).

1996

(i) If p and q are two integers $p\neq0$, $p=-q$, which of the following nust be true

a. p<q b. p+q < 0 c. p-q < 0 d. pq < 0

(iv) The multiplicative identity in $\mathbb{C}$ is ____________.

Q. What is the imaginary part of $\frac{(2+i)^2}{3-4i}$?

1997

Q. Prove that $|z_1 z_2| = |z_1| |z_2|$, where z_1, z_2 are the complex numbers

1998

Q. Solve the complex equation $(x + 2yi)^2 - xi$.

Q. Find the additive inverse and the multiplicative inverse of (2 – 3i).

Q. Is there a complex number whose additive and multiplicative inverse are equal?

1999

Q. Divide (4 + i) by (3 – 4i).

Q. Prove that $\left(\frac{3}{25}, \frac{-4}{25}\right)$ is the multiplicative inverse of (3, 4).

Q. Multiply (-3 , 5) by (2, -1)

2000

Q. Separate into real and imaginary parts: $\frac{1+2i}{2-i}$ and hence find $\left|\frac{1+2i}{2-i}\right|$.

Q. By using definition of multiplicative inverse of two ordered pairs, find the multiplicative inverse of (5, 2).

Q. Solve the equation (2, 3) (x, y) = (- 4, 7)

2001

Q. Define modulus and the conjugate of complex number $z = x + iy$, where $i = \sqrt{-1}$, If $z = \frac{1+i}{1-i}$, then show that $z.z = |z|^2$.

Q. Verify that: $\frac{1+3i}{3-5i} + \frac{2}{17} = \frac{-4}{17} + \frac{7i}{17}$

2002

Q. Find the multiplicative inverse of $\frac{\sqrt{3}+i}{\sqrt{3}-i}$,separating the real and imaginary parts.

Q. Solve the following complex equation: (x, y) (2, 3) = (5, 8)

2003

Q. If $Z_1 = 1 + i$ and $Z_2 = 3 - 2i$, then evaluate $|5Z_1 = 4Z_2|$.

Q. Separate $\frac{7+5i}{4+3i}$ into real and imaginary parts.

Q. Find the additive inverse and multiplicative inverse of (3, -4)

2004

Q. If Z_1 and Z_2 are complex numbers, verify that $|Z_1 . Z_2| = |Z_1| , |Z_2|$.

Q. Solve the following complex equation (x, y) . (2, 3) = (5, 8)

2005

Q. Solve the complex equation $(x + 2yi)^2 = xi$

2006

Q. Show that $(a, b)\left(\frac{a}{a^2+b^2}, \frac{-b}{a^2+b^2}\right) = (1,0)$

Q. If z = (x,y) , then show that $z.z = |z|^2$

2007

Q. if $Z_1 = 1 + i$ and $Z_2 = 3 - 2i$, evaluate $|5Z_1 - 4Z_2|$.

Q. Solve the complex equations (x,y) , (2,3) = (-4 , 7)

Q. Separate the following into real and imaginary parts: $\frac{1+2i}{3-4i} + \frac{2}{5}$

2008

Q. Express $x^2 + y^2 = 9$ in terms of conjugate coordinates.

Q. If $z_1 = 1 + i$, $z_2 = 3 - 2i$, evaluate $|5z_1 - 4z_2|$.

Q. Find the real and imaginary parts of I (3 + 2i).

Q. Find the multiplicative inverse of the complex number (3, -5)

2009

(x) The multiplicative inverse of (c,d) is:

a. $\left(\frac{c}{d}, \frac{d}{c}\right)$ b. $\left(\frac{1}{c}, \frac{1}{d}\right)$ c. $\left(\frac{c}{c^2+d^2}, \frac{-d}{c^2+d^2}\right)$ d. $\left(\frac{1}{c^2}, \frac{-1}{d^2}\right)$

(xi) The conjugate of a complex number (a,b) is:

a. (-a, -b) b. (a,-b) c. (-a,b) d. $\left(\frac{a}{b}, \frac{b}{d}\right)$

(xiii) The value of i^3 = ____________.

a. –i b. 1 c. -1 d. i

2010

(v) The real and imaginary parts of i(3-2i) are respectively:

a. -2 & 3 b. 2 & -3 c. 2 & 3 d. -3 & -2

Q. Solve the complex equation $(x, y)(2,3) = (-4,7)$

2011

(ii) (a,b)(c,d) = ___________

a. (ac-bd, ad+bc) b. (ac,bd) c. (ac+bd, ad-bs) d. (ad,bc)

(iii) The real and imaginary parts of i(2-3i) are:

a. -3 & 2 b. 3 & 2 c. 2 & 3 d. -2 & -3

Q. Solve the complex equation $(x + 3i)^2 = 2yi$

2012

None

2013

None

2014

None

2015

Q. Solve the following complex equation: $(x, y)(2, 3) = (-4, 7)$

CHAPTER # 03 EQUATIONS

QUADRATIC EQUATIONS PORTION

1991

Q. Solve the equation $(2x + 5)^4 + (2x + 1)^4 = 82$.

Q. For what values of p and q will both the roots of the equation $y^2 + (2p-4)q = 31 + 5$ vanish?

1992

Q. If α, β are the roots of $px^2 + qx + r = 0$, $p \neq 0$, form the equation whose roots are:

$$(2\alpha + \tfrac{1}{\alpha}) \;,\quad (2\beta + \tfrac{1}{\beta})$$

1993

Q. Show that: $\left(\frac{-1+\sqrt{-3}}{2}\right)^7 + \left(\frac{-1-\sqrt{-3}}{2}\right)^7 + 1 = 0$

Q. If α , β are the roots of the equation $lx^2 + mx + n = 0$, $1 \neq 0$ from the equation whose are $\frac{1}{\alpha^3}$ and $\frac{1}{\beta^3}$.

1994

Q. Form an equation whose roots are $-1 \pm i$.

Q. Solve the equation: $\sqrt{\frac{1-x}{x}} + \sqrt{\frac{x}{1-x}} = \frac{13}{6}$

Q. Find the condition that one root of the equation $px^2 + qx + r = 0$ may be square of the other.

1995

Q. If the equation $x^2+(7+a)x + 7a + 1 = 0$ has equal roots, find the value of a.

Q. Solve: $(2x^2-4x+4)^2 - 12(x^2-2x) - 40 = 0$

Q. Find the condition that one root of $px^2+qx+r = 0$, may be double of the other.

1996

Q. If $4^{x+1} = 64$, what is the value of x?

*2 *3 *4 *5

Q. If α, β are the roots of $x^2 - 3x + 1 = 0$, find the equation whose roots are $1 + \alpha + \alpha^2$ and $1 + \beta + \beta^2$

1997

Q. Find the value of 'k' by synthetic division method so that $x - i$ is a factor of $P(x)$ where $P(x) = 2kx^4 + 7x^3 + kx^2 + 7x - 1$.

Q. Find the solution set of the following equation.

$$1 + 3x + 4x^2 + 3x^3 + x^4 = 0.$$

Q. If α , β are the roots of the equation $ax^2 + bx + c = 0$, $a \neq 0$, form an equation where roots are $(2\alpha + \frac{1}{\beta})$ and $(2\beta + \frac{1}{\alpha})$.

1998

Q. If α, β are the roots of the equation $px^2 + qx + r = 0$, $p \neq 0$, form the equation whose roots are $(\alpha^2 + \beta^2)$ and $(\frac{1}{\alpha^2} + \frac{1}{\beta^2})$.

1999

Q. Solve the equation: $\sqrt{2x+7} + \sqrt{x+3} = 1$

2000

Q. If α, β are the roots of the equation $x^2 - 3x + 2 = 0$, form the equation whose roots are $(\alpha + \beta)^2$ and $(\alpha - \beta)^2$.

Q. Show that $\omega^{155} + \omega^{247} + i^{360} = 0$ where ω is the cube root of unity and $i=\sqrt{-1}$

2001

Q. Show that all cube roots of -27 are -3, -3ω and $-3\omega^2$, where ω and ω^2 are the complex cube roots of unity.

Q. If α and β are the roots of the equation $px^2 + qx + r = 0$ $(p \neq 0)$, form an equation whose roots are α^2 and β^2.

2002

Q. For what values of 'k' will the equation. $x^2 - 2(1+3k)\,x + 7(3+2k) = 0$, have equal roots?

Q. If α,β are the roots of $px^2+qx+r=0$, from the equation whose roots are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$.

2003

Q. Prove that $\omega^{49} + \omega^{101} + \omega^{150} = 0$, where ω is a complex cube root of unity.

Q. If α, β are the roots of $3x^2 - 7x + 8 = 0$, find the value of: i) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ ii) $\left(\alpha + \frac{1}{\alpha}\right)\left(\beta + \frac{1}{\beta}\right)$

2004

Q. For what value of k will x + 5 be a factor of $2x^3 + kx^2 - 2x + 15$?

Q. Solve the equation $(x - 9)(x - 7)(x + 3)(x + 1) - 384 = 0$.

Q. If α and β are the roots of $\alpha x^2 + bx + c = 0$, $a \neq 0$, find the equation whose roots are α^3 and β^3.

2005

Q. Solve the equation: $\left(x - \frac{1}{x}\right)^2 + 3\left(x + \frac{1}{x}\right) = 0$

Q. Find the condition that one root of $px^2 + qx + r = 0$, $p \neq 0$ may be double the other root.

2006

Q. Solve $y^6 - 26y^3 - 27 = 0$.

Q. Find all the cube rots of 27. Also show that their sum is zero.

Q. Find 'k' if one root of 4y2 – 7ky + k + 4 = 0 is zero.

2007

Q. Prove that the roots o, the equation $x^2 - 2x\left(m + \frac{1}{m}\right) + 3 = 0$ are real.

Q. If α, β are the roots of the equation px2 – qx – r = 0, $p \neq 0$, find the equation whose roots are α^3 and β^3.

2008

Q. Solve the following equation: $\frac{x-3}{x+3} + \frac{x+3}{x-3} = 2\frac{4}{15}$

Q. Find the equation whose roots are the reciprocal of the roots of $x^2 - 6x + 8 = 0$.

2009

(xii) If ω is a cube root of unity then ω^{32}= ____________.

a. 0 b. ω^2 c. ω d. 1

(xiv) If the roots of the equation $ax^2+bx+c=0$ are real and unequal then b^2-4ac

a. less than zero b. equal to zero c. greater than zero d. equal to 1

(xv) For the equation $lx^2+mx+n=0$, the sum of roots =

a. l+m b. $\frac{m}{l}$ c. $\frac{n}{l}$ d. $-\frac{m}{l}$

Q. Solve the following equation:

Q. Determine the value of k for which the roots of the following equation are equal:

$$(k + 1)x^2 + 2(k + 3)x + 2k + 3 = 0$$

Q. If α, β are the roots of the equation $ax^2 + bx + c = 0$, from the equation whose roots are $\frac{\alpha+1}{\alpha}$, $\frac{\beta+1}{\beta}$

2010

(vi) The roots of the equation $ax^2+bx+c=0$ are complex then b^2-4ac

a. -ve b. +ve c. 0 d. perfect square

(vii) If ω is the cube roots of unity then ω^3 =

a. ω b. 0 c. ω^2 d. 1

(viii) For the equation $px^2+qx+r=0$, the sum of roots =
a. $-\frac{q}{p}$ b. $\frac{q}{p}$ c. $\frac{p}{q}$ d. $-\frac{p}{q}$

Q. If α and β are the roots of the equation $px^2+qx+r=0, (p \neq 0)$, find the value of $\alpha^3+\beta^3$.

Q. If $\{1, \omega, \omega^2\}$ are the cube roots of unity, prove that $(2+\omega^2) = \frac{3}{2+\omega}$

2011

(iv) The roots of the equation $ax^2+bx+c=0$ are real and distinct, if b^2-4ac is:
a. 0 b. +ve C. -ve d. none zero

(v) The product of the roots of the equation $3x^2 - 5x + 2 = 0$ is:
a. $\frac{3}{5}$ b. $\frac{2}{3}$ c. $\frac{3}{2}$ d. $\frac{5}{3}$

(ix) If ω is the cube roots of unity then ω^{16} =
a. 0 b. ω^2 c. ω d. 1

Q. Solve the equation: $\sqrt{\frac{1-x}{x}} + \sqrt{\frac{x}{1-x}} = \frac{13}{6}$

Q. If α, β are the roots of the equation $x^2 - 3x + 2 = 0$, from the equation whose roots are $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$.

2012

Q. Solve: $(x+6)(x+1)(x+3)(x-2)+56=0$

Q. For what value of k, $x^2-2(1+3k)+7(3+2k)=0$ has equal roots.

Q. If α, β are the roots of the equation $px^2-qx+r=0$, form an equation whose roots are $-\frac{1}{\alpha^3}$ and $-\frac{1}{\beta^3}$

2013

Q. Prove that the roots o, the equation $x^2 - 2x(m + \frac{1}{m}) + 3 = 0$ are real.

Q. If α, β are the roots of the equation $2x^2+3x+4=0$, form an equation whose roots are α^2 and β^2

Q. Solve: $\sqrt{\frac{x+16}{x}} + \sqrt{\frac{x}{x+16}} = \frac{25}{12}$

Q. If α, β are the roots of the equation $px^2+qx+q=0$, $p \neq 0, q \neq 0$, Prove that: $\sqrt{\frac{q}{p}} + \sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} = 0$

2014

Q. Determine the value of k for which the roots of the following equation are equal:
$$(k+1)x^2 + 2(k+3)x + 2k + 3 = 0$$

Q. Solve the equation: $x^4 + x^3 - 4x^2 + x + 1 = 0$

Q. If α, β are the roots of the equation $y^2 - 2y + 3 = 0$; form an equation whose roots are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$.

2015

Q. Prove that the roots of the equation $x^2 - 2x\left(m + \frac{1}{m}\right) + 3 = 0$ are real.

Q. Prove that the cube roots of -125 are $-5, -5\omega, -5\omega^2$ and their sum is zero. (where ω being the complex cube roots of unity)

Q. Solve the equation: $\left(t + \frac{1}{t}\right)^2 = 4\left(t + \frac{1}{t}\right)$

Q. If α, β are the roots of the equation $px^2 + qx + r = 0; p \neq 0$, then find the equation whose roots are $-\frac{1}{\alpha^3}$ and $-\frac{1}{\beta^3}$.

SYSTEMS OF TWO EQUATIONS INVOLVING TWO VARIABLES (EXERCISE: 3.8)

1991

Q. The sum of the circumferences of two circles is 24 π meters and the sum of their areas is 80 π square meters. What are the radii of the circles?

1992

Q. Solve the check: $2x + 3y = 2$, $2x^2 - 3y^2 = 20$

1993

Q. Solve: $x+y=5, \frac{2}{x} + \frac{3}{y} = 2$

1994

None

1995

None

1996

Q. Solve for x: $\frac{x}{a-x} - \frac{a-x}{x} = a$

1997

None

1998

Q. Solve the check: $3x + 2y = 7$, $3x^2 - 2y^2 = 25$

1999

Q. Solve the check: $2x^2 + y^2 = 13$, $5x^2 - 2y^2 = -8$

2000

Q. Solve the following system of equation: $x - y - 5 = 0$, $x^2 + 2xy + y^2 = 9$

2001

Q. The sum of the circumferences of two circles is 24 π meters and the sum of their areas is 80 π square meters. What are the radii of the circles?

2002

Q. Solved the following system of equation: $x^2 + y^2 = 169$, $x - y - 13 = 0$

2003

Q. Solve the following system of equations: $12x^2 - 25xy + 12y^2 = 0$, $x^2 + y^2 = 25$

2004

Q. Solve the check the equations $x^2 + y^2 = 5$ and $xy = 2$

2005

Q. Solve the equations: $x + y = 5, \frac{2}{x} + \frac{3}{y} = 2$

2006

None

2007

Q. Solve the system of equation: $xy + 6 = 0$, $x^2 + y^2 = 13$

2008

Q. Solve the system of equations: $x+y =5, \frac{3}{x} + \frac{2}{y} = 2$

2009

Q. Solve the system of equations: $4x + 3y = 25, \frac{4}{x} + \frac{3}{y} = 2$

2010

Q. Solve: $x+y = 5, \frac{3}{x} + \frac{2}{y} = 2$

2011

None

2012

Q. Solve the following system of equations: $2x+3y=7,\ 2x^2-3y^2=-25$

2013

Q. Solve the following system of equations: $x^2 + y^2 = 25,\ (4x - 3y)(x - y - 5)=0$

2014

Q. Solve the system of equation: $x^2 + y^2 = 34,\ xy + 15 = 0$

2015

Q. Solve the system of equation: $4x^2 + y^2 = 25, y^2 - 2x = 5$

CHAPTER # 04 MATRICES AND DETERMINANTS

MATRICES PORTION
(EXERCISE: 4.1)

1991

Q. Verify that $(AX)^t = x^t A^t$, where: $A = \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} 2 \\ 0 \end{bmatrix}$ *and* $X = \begin{bmatrix} 2 & 1 \\ 0 & 2 \\ 1 & -1 \end{bmatrix}$

1992

Q. If A=$\begin{bmatrix} 4 & -2 & 0 \\ 5 & 6 & -7 \\ -3 & 1 & 9 \end{bmatrix}$, C=$\begin{bmatrix} 2 & 3 \\ -4 & 0 \\ -1 & 3 \end{bmatrix}$. Then compute C^tA^t.

1993

None

1994

Q. What is a null matrix? Prove that: $\left\{\begin{bmatrix} \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \\ \omega & \omega^2 & 1 \end{bmatrix} + \begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix}\right\}\begin{bmatrix} 1 \\ \omega \\ \omega^2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

Where ω is a complex cube root of unit.

1995

None

1996

Q. If A=$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 6 & 8 \\ -1 & 2 & -1 \end{bmatrix}$, Find KA and K|A|.

1997

Q. Define a Singular Matrix. Find the value of λ for which the following matrix becomes Singular. A = $\begin{bmatrix} \lambda & 1 & 0 \\ 1 & \lambda & 2 \\ 0 & 2 & \lambda \end{bmatrix}$

1998

None

1999

None

2000

None

2001

Q. Solve for z: $\begin{bmatrix} -2 & 3 \\ 4 & -1 \end{bmatrix}\begin{bmatrix} 1 & z & 5 \\ 2 & 4 & z \end{bmatrix}\begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ -14 \end{bmatrix}$

Q. Define the following terms:
(i) Transpose of a matrix (ii) Diagonal matrix (iii) Scalar matrix (iv) Unit matrix

2002

Q. Perform the Matrix multiplication.

$$\begin{bmatrix} a & b & c \end{bmatrix}\begin{bmatrix} x & f & g \\ f & y & h \\ g & h & z \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix}$$

2003

Q. If A = $\begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$, B = $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$, where i = $\sqrt{-1}$. Verify that $A^2 = B^2 = -I_2$

2004

Q. Solve for x : $\begin{bmatrix} -2 & 3 \\ 4 & -1 \end{bmatrix}\begin{bmatrix} 1 & x & 5 \\ 2 & 4 & x \end{bmatrix}\begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 & -14 \end{bmatrix}^t$

2005

None

2006

Q. If possible, find the matrix X such that: $\begin{bmatrix} 2 & -3 \\ 0 & 1 \end{bmatrix}. X = \begin{bmatrix} -2 & 5 \\ 8 & -7 \end{bmatrix}$

2007

Q. Solve the following for x: $\begin{pmatrix} -2 & 3 \\ 4 & -1 \end{pmatrix}\begin{pmatrix} 1 & x & 5 \\ 2 & 4 & x \end{pmatrix}\begin{pmatrix} -3 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 2 \\ -14 \end{pmatrix}$

Q. Find the inverse of matrix A by the Adjoint method if A = $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 3 & 0 \\ 2 & 1 & -1 \end{bmatrix}$

2008

Q. Prove that: $\left\{\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix} + \begin{bmatrix} \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \\ \omega & \omega^2 & 1 \end{bmatrix}\right\}\begin{bmatrix} 1 \\ \omega \\ \omega^2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

2009

If the order of the matrices A and B are m x n and n x 1 respectively, then the order of AB is:
a. m x p b. p x n c. n x p d. p x m

Q. Solve of x: $\begin{bmatrix} -2 & 3 \\ 4 & -1 \end{bmatrix}\begin{bmatrix} 1 & x & 5 \\ 2 & 4 & x \end{bmatrix}\begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 & -14 \end{bmatrix}^t$

2010

Q. Verify that: $\begin{bmatrix} sin\theta & -cos\theta \\ cos\theta & sin\theta \end{bmatrix}\begin{bmatrix} sin\theta & cos\theta \\ -cos\theta & sin\theta \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

2011

Q. If $\begin{bmatrix} 2\lambda & 3 \\ 4 & 2 \end{bmatrix}$ is a singular matrix then value of λ is:

a. 3 b. 2 c. $\frac{1}{2}$ d. 4

2012

None

2013

Q. Find x, y, z and v so that $\begin{bmatrix} 4 & x+y \\ z+v & 3 \end{bmatrix} = 3\begin{bmatrix} x & y \\ z & v \end{bmatrix} + \begin{bmatrix} x & 6 \\ -1 & 2v \end{bmatrix}$

2014

None

2015

Q. Find x, y, z and v so that $\begin{bmatrix} 4 & x+y \\ z+v & 3 \end{bmatrix} = 3\begin{bmatrix} x & y \\ z & v \end{bmatrix} + \begin{bmatrix} x & 6 \\ -1 & 2v \end{bmatrix}$

DETERMINANTS AND INVERSE MATRICES PORTION (EXERCISE: 4.2 TO 4.4)

1991

Q. Solve by matrix method: 9x + 7y + 3t = 6, 5x – y + 4t = 1, 6x + 8y + 2t = 4

1992

Q. Solve for x : $\begin{vmatrix} x^2-a^2 & x^2 & x \\ b^2-a^2 & b^2 & b \\ c^2-a^2 & c^2 & c \end{vmatrix} = 0$

Q. Solve the equations by Cramer's Rule.

x + 2y + z = 8
2x – y + z = 3
x + y – z = 0

1993

Q. Using the properties of the determinants, evaluate the determinant:

$$\begin{vmatrix} 2l+m+n & m & n \\ l & l+2m+n & n \\ l & m & l+m+2n \end{vmatrix}$$

Q. Use matrix method to solve the system of equations: $2x_1 - x_2 + 2x_3 = 4$, $x_1 + 10x_2 - 3x_3 = 10$, $x_1 + x_2 + x_3 = -6$

1994

Q. Making use of the properties of the determinants, solve for x the equation:

$$\begin{vmatrix} x^2+a^2 & x^2 & x \\ b^2+a^2 & b^2 & b \\ c^2+a^2 & c^2 & c \end{vmatrix} = 0$$

1995

Q. If A = $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 7 \\ 9 & 8 & 6 \end{bmatrix}$, then verify that A.(Adj A) = $|A|I_3$.

Q. Evaluate: $\begin{vmatrix} \omega & 1 & \omega^2 \\ \omega^2 & \omega & 1 \\ 1 & \omega^2 & \omega \end{vmatrix}$

1996

Q. Using the properties of determinants, evaluate the following:

$$\begin{vmatrix} a+1 & a+3 & a+5 \\ a+4 & a+6 & a+8 \\ a+7 & a+9 & a+11 \end{vmatrix}$$

1997

Q. By using the properties of determinant, express the following determinant in factors:

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$$

1998

Q. Using the properties of determinants, prove that: $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$ = (a – b) (b – c) (c – a)

Q. Use matrix method to solve the following equations:
x + y + z = 2, 2x – y – z = 1, x – 2y – 3z = -3

1999

Q. Find the inverse of the Matrix by adjoint method: A = $\begin{bmatrix} 2 & 2 & 3 \\ 1 & -1 & 0 \\ -1 & 2 & 1 \end{bmatrix}$

2000

Q. Express the following determinant in factors form by using properties of determinant.

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$$

Q. Apply matrix method to solve the following system of equation:

9x + 7y + 30 = 6, 5x – y + 40 = 1, 6x + 8y + 20 = 4

2001

Q. Using the properties of determinants, show that: $\begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$ = (x –y) (y – z) (z – x)

2002

Q. Use Adjoint method to solve the equations.

2x – y + 2z = 4, x + 10y – 3z = 10, x – y – z = 6

Q. Use properties of determinants, solve for x: $\begin{vmatrix} 1 & a & b \\ 1 & a & x \\ 1 & x & c \end{vmatrix} = 0$

2003

Q. Using the properties of determinants, show that: $\begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$ = (x –y) (y – z) (z – x)

2004

Q. Find the adjoint of the matrix A = $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 6 & 8 \\ -1 & 2 & -3 \end{bmatrix}$

Q. Solve the determinant for x: $\begin{vmatrix} 1 & a & b \\ 1 & x & b \\ 1 & c & x \end{vmatrix} = 0$

2005

Q. Evaluate using the properties of the determinant: $\begin{vmatrix} x+y+2z & z & z \\ x & y+z+2x & x \\ y & y & z+x+2y \end{vmatrix}$

2006

Q. Use the matrix method to solve the following system of linear equation:

2x – y + 2z = 4, x + 10y – 3z = 10, -x + Y + Z = -6

2007

Q. Prove the following by using the properties of determine:

$$\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ yz & zx & xy \end{vmatrix} = (x-y)(y-z)(z-x)$$

Q. Find the inverse of a matrix A by the ad joint method if A = $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 3 & 0 \\ 2 & 1 & -1 \end{bmatrix}$

2008

Prove the following by using the properties of determine: $\begin{vmatrix} a+x & a & a \\ a & a+x & a \\ a & a & a+x \end{vmatrix} = x^2(3a+x)$

Q. Find the inverse of A = $\begin{bmatrix} 2 & 2 & 3 \\ 1 & -1 & 0 \\ -1 & 2 & 1 \end{bmatrix}$ by Adjoint method.

2009

Q. Solve the following system of equations by using the matrix method:
x + y = 5, y + z = 7, z + x = 6

2010

Q. Using the properties of determination, show that:

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

Q. Use the Adjoint Method to solve the given equations:

$$2x - y + 2z = 4$$
$$x + 10y - 3z = 10$$
$$x - y - z = 6$$

2011

Q.By using the properties of determinants, prove that: $\begin{vmatrix} 1 & 1 & 1 \\ \alpha & \beta & \gamma \\ \beta\gamma & \gamma\alpha & \alpha\beta \end{vmatrix} = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)$

2012

Q. By using the properties of determinants, prove that: $\begin{vmatrix} a+x & a & a \\ a & a+x & a \\ a & a & a+x \end{vmatrix} = x^2(3a+x)$

Q. Solve the following system of equations by using the matrix method:
x+y=5, y+z=7, z+x=6

2013

Q. Find the Inverse of $A = \begin{bmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 5 & 2 & -3 \end{bmatrix}$ by adjoint method.

Q. By using the properties of determinants, express the following determinant in factorized form:

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ bc & ac & ab \end{vmatrix}$$

2014

Q. Using the properties of determinants, prove that: $\begin{vmatrix} a+y & a & a \\ a & a+y & a \\ a & a & a+y \end{vmatrix} = y^2(3a+y)$

Q. For what value of λ if $\begin{bmatrix} 5 & 8 & 2 \\ 0 & \lambda & 2 \\ 9 & -8 & 4 \end{bmatrix}$ is a singular matrix.

Q. Solve the following system of equations by Cramer's Rule: $x + y = 5, y + z = 7, z + x = 6$

2015

Q. Using the properties of determinant, evaluate: $\begin{vmatrix} a+x & a & a \\ a & a+x & a \\ a & a & a+x \end{vmatrix}$

Q. Solve the following system of equations by using the matrix method: $x+y=5, y+z=7, z+x=6$

CHAPTER # 05 GROUPS

1991

Q. Let A = {1, W, W^2}, where W is a complex cube root of unity. Check whether the given set is closed, commutative and associative with respect to the operation of multiplication.

1992

Q. Let S = {1, ω, ω^2}, ω^2 being a complex cube root of unity.
Construct a composition table with respect to multiplication on C and show that (S_1) is a Group.

1993

Q. Let S={A,B,C,D}, where A={1}, B={1,2}, C={1,2,3} and D= Ø. Construct the multiplication Table to show that ∩ and ∪ are binary operation on "S".

1994

Q. Let S = {1, ω, ω^2} ω^2 being a complex cube root of unity. Construct a composite table with respect to multiplication on C, and show that (S, 0) is a group.

1995

Q. State whether the following are True or False. Given reasons.
Is (z, ≡) a group where is defined by a * b = 0, for all a, b∈Z.

1996

Q. (i) If p and q are two integers $p \neq 0$, p = -q which of the following must be true:
* p < q * p < q * p + q < 0
* p – q < 0 * pq < 0
(ii) A groupoid (s.*) is a semi-group if ________?
(iii) Is ordered pair (3, 5) equal to the ordered pair (5, 3)?
(iv) The multiplicative identity in C is _____.

Q. Let A = {0, 1, 2, 4}, Define a * b = a, $\forall_{a,b}$ ΣA. Construct the table for * in A.

1997

Q. Define binary operation, a * b = 4a. b ∀ a, b ϵ Q. If '.' Represents the ordinary multiplication, then show that:
(i) $\frac{1}{4}$ is the identity element w.r.t.*
(ii) $\frac{1}{12}$ is the inverse of

Q. Show that the set of all the matrices of the form $\begin{bmatrix} COS\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$, θ is a real number form an abelian group w.r.t. multiplication.

1998

Q. Let A = {1, ω, ω^2}, where ω is a complex cube root of unity. Check whether the given set is closed, cumulative and associative, with respect to the operation of multiplication.

1999

Q. Show that (R, *) is a group if '*' is defined in R by a * b = 7ab, ∀a, b ∈ R.

2000

Q. Let us define a binary operation * in the set of rational numbers Q by a * b = 5ab for a, b ∈ Q. Prove that * is associative and commutative. Also, verify that $\frac{1}{5}$ is identity element and $\frac{7}{50}$ is the inverse element of $\frac{2}{7}$ w.r.t.

2001

Q. Let * be defined in Z by p * q = p + q + 4, hence show that:
(i) * is associative
(ii) Identity with respect to * exists in Z.

(iii) Every element of Z has an inverse under * in Z; where Z is the set of integers.

2002

Q. Define a binary operation (*) in Q, by a * b = 4a.b, where: Represents ordinary multiplication. Also show that:

(a) (*) is commutative.
(b) (*) is associative.
(c) $\frac{1}{2}$ is the identity element under (*).
(d) $\frac{1}{12}$ is the inverse element of ¾ under (*).

2003

Q. Construct the multiplication table to show that multiplication is a binary operation on S = {1, -1, i, -i}, where i = $\sqrt{-1}$.

2004

Q. Let S = {1, ω , ω^2}, where ω is a complex cube root of unity. Check whether the given set 'S' is closed, commutative and associative with respect to the operation of multiplication.

2005

Q. Show that S = {1, -1, i, -i} forms a finite abelian group under usual multiplication of complex numbers.

2006

Q. Using the multiplication table, find whether 'X' is a binary operation on $S=\{1,\omega,\omega^2\}$

2007

Q. Let $S=\{1,-1,i,-1\}$, construct the composition table w.r.t to Multiplication, and show that (.) is commutative and associative in S.

2008

Q. T is the set of real number of the form a+b√2, where a, b ε Q and a, b are not simultaneously zero. Show that (T, •) is a group where " •" is an ordinary multiplication.

2009

Q. Let * be defined in Z, the set of all integers, as a *b = a + b + 3. Show that:

(a) * is commutative and associative.
(b) Identity w.r.t. * exists in Z.
(c) Every element of Z has an inverse w.r.t. *.

2010

Q. Using the multiplication table show that multiplication is a binary operation on $S=\{1,-1,i,-i\}$. Also show that (.) is commutative.

2011

Q. Using the multiplication table show that multiplication is a binary operation on $S=\{1,-1,i,-i\}$. Also show that (.) is commutative.

2012

Q. Let S = {1, ω , ω^2}, where ω is a complex cube root of unity. Construct a composition table with respect to multiplication on ℂ and show that:

(a) Associative law holds in S
(b) 1 is the identity element in S
(c) Each element in 'S' has it inverse in 'S'

2013

Q. Let S={A,B,C,D}, where A={1}, B={1,2}, C={1,2,3} and D= Ø. Construct the multiplication Table to show that ∩ and ∪ are binary operation on "S".

Q. Let S = $\{1, \omega, \omega^2\}$, where ω is a complex cube root of unity. Construct multiplication table with respect to $(.)$ and show that:

(a) (.) is binary operation on S (b) 1 is the identity element in S

2014

Q. $A = \{1, -1, i, -i\}$, construct the composition table (.) in A, also show that (.) is commutative in A.

2015

Q. $A = \{1, -1, i, -i\}$, construct the multiplication for complex numbers multiplication $(\cdot)$ in A, also show that $(\cdot)$ is commutative in A.

CHAPTER # 06 SEQUENCES AND SERIES

1991

Q. Find the sum to 20 terms of an A.P whose 4th term is 7 and the 7th term is 13.

Q. If a rubber ball is dropped on the floor from a height of 27 meters, it always rebounds to two-third of the distance of the previous fall; find the distance it will have traveled before hitting the ground for the seventh time.

Q. If A,G, H be respectively the A.M., the G.M. and H.M. between any two numbers and Ax = Gy = Hz, prove that x, y, z are in G.P.

1992

Q. The sum of four numbers in A.P. is 20. The ratio of the product of the first and the last numbers and the product of 2nd and 3rd numbers is 2 : 3 ; find the numbers.

Q. The sum of infinite timers of a G.P. is 4 and the sum of their cubes is 192; find the G.P.

Q. Find the sum of the following series: $16^2 + 17^2 + 18^2 + \ldots + 40^2$

1993

Q. Sum the series: 0.6 + 0.66 + 0.666 + ……. to n terms.

Q. Prove that a, b, c are in either A.P. or G.P. or H.P according as $\frac{a(b-c)}{a-b}$ = a or b or c.

1994

Q. Find the three numbers in A.P. whose sum is 12 and whose product is 28.

Q. Sum the series $1 + \frac{3}{2} + \frac{5}{4} + \frac{7}{8} + \ldots$ to infinity

Q. If A, G, H are respectively the arithmetic, geometric and harmonic means between any two numbers, prove that $G^2 = AH$.

1995

Q. Find the six terms of the series in A.P. of which the sum to 'n' terms is $\frac{n}{2}(7n - 1)$.

Q. The third term of a G.P. is 27 and the sixth term is 8; find the sum to infinite terms.

Q. Insert four H.Ms between 12 and $\frac{48}{5}$.

1996

Q. If the sum of first n natural numbers is 15 and the sum of the first n + 1 natural numbers is 21, then 'n' is:

* 3 * 4 * 5 * 6 * 10

Q. The sum of first 14 terms of 1, 1.4, 1.8 …… is equal to the sum of first n terms of 5.6, 5.8, 6.0, ………, find the value of n.

Q. The first three terms of a G.P. are x + 10, x – 2, x – 0 respectively. Calculate the value of x and hence find the sum to infinity of this series.

Q. Which term of the H.P. 6, 2, 6/5, …… is equal to $\frac{2}{33}$?

1997

Q. How many terms of the sequence -9, -6, -3 ………. must be taken for the sum of the terms to be 66?

Q. The product of three number in G.P is 216 and the sum of their product in pairs is 156, find the numbers.

Q. If $\frac{x-y}{y-z} = \frac{x}{z}$, then prove that x, y, z are in H.P.

1998

Q. The sum of four terms in A.P is 4, the sum of the product of the first and the last term and the two middle terms is – 38; find the numbers.

Q. If a rubber ball that is dropped on the floor from a height of 27 meters, always rebounds one-third of the distance of the previous fall, find the distance it will have traveled before hitting the ground for the ninth time.

1999

Q. Find the sum of 15 terms of an A.P whose middle term is – 42.

Q. Find the sum of an infinite series in G.P. if the sum of the first and the fourth terms is equal to 54 and the sum of the second and the third term is 36 find the series also.

Q. Find the 12^{th} term of an H.P. if it is given that its second term is 3 and 4^{th} term is 2.

2000

Q. The sum of the first in terms of two A.P's are as 3n+1:13–7n. Find ratio of their second terms.

Q. Find the G.P. whose second term is 2 and the sum to infinity is 8.

Q. Simplify $\frac{x(y-z)}{x-y}$ when x, y, z are in H.P.

2001

Q. Find the sum of all natural numbers between 250 and 1000 which are exactly divisible by 7.

Q. Which term of the geometric sequence 27, 18, 12 …….. is $\frac{512}{729}$?

Q. The 12^{th} term of an H.P. is $\frac{1}{5}$ and the 19^{th} term is $\frac{3}{22}$; find the 10^{th} term of the H.P.

2002

Q. Which term of H.P. 12, 4/13, 2/9,………… is 1/42?

Q. The base of a right-angled triangle is 10 cm, and the sides of the triangle are in A.P.; find the hypotenuse.

Q. The sum of infinite term of a G.P. is 3, and the sum of their cubes is 81; find the G.P.

2003

Q. Find the sum of 20 terms of an A.P. whose 4^{th} terms is 7 and the 7^{th} term is 13.

Q. Express the recurring decimal 0.237 as a rational number.

Q. Simplify $\frac{x(y-z)}{x-y}$ when x, y, z are in

(i) A.P. (ii) G.P and (iii) H.P.

2004

Q. Find the sum of an A.P. of 17 terms whose middle term is 5.

Q. Find the value of n such that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may become the arithmetic mean between a and b.

Q. Show that the product of n geometric means between a and b is $(ab)^{n/2}$.

2005

Q. Find the sum of all natural numbers between 1 and 100 which are not exactly divisible by 2 or 3.

Q. Find three numbers in G.P whose sum is 19 and whose product is 216.

2006

Q. The ratio of the sum of the first four terms of a G.P to the sum of the first eight terms of the same G.P is 81:97; find the common ratio of the G.P.

Q. If the 3^{rd}, 6^{th} and the last terms of an H.P are respectively $\frac{1}{3}, \frac{1}{5}, \frac{3}{203}$, find the number of terms of the H.P.

2007

Q. The sum of four terms of an A.P. is 4 and the sum of the product first and the last and the two middle terms is -38, find the A.P.

Q. Find the G.P. whose third term is $\frac{9}{4}$ and whose sixth term is $\frac{243}{32}$.

Q. The pth term of an H.P. is q and the qth term is p: find (p+ q)th term and (p. q)th term.

2008

Q. The sum of p terms of an A.P is q the sum of q terms of the same A.P is p: find the sum of (p + q) terms.

Q. Find the 17^{th} trem of an H.P whose first two terms are 6 and 8.

Q. Find the sum to n terms of the A.G series:

$$1+3r+5r^2+7r^3+\ldots\ldots\ldots$$

2009

Q. Express the value of the recurring decimal $0.4\dot{2}\dot{3}$ as a common fraction.
Q. Show that the sum of the $(p + q)^{th}$ term and $(p - q)^{th}$ term of an A.P. is equal to twice the p^{th} term.
Q. If the p^{th} term of an H.P. is q, the q^{th} term is p; prove that the $(p + q)^{th}$ term is $\frac{pq}{p+q}$.

2010

Q. If the sum of 8 terms of an A.P. is 64 and the sum of its 19 terms is 361, find the sum of 31 terms of the A.P.
Q. Insert 4 harmonic means between 12 and $\frac{48}{5}$.

2011

Q. Find the sum of 20 terms of an A.P whose 4^{th} term is 7 and 7^{th} term is 13.
Q. Which term of the sequence 27, 18, 12, . . . $\frac{512}{729}$?
Q. The 12^{th} term of an H.P is $\frac{1}{5}$ and 19^{th} term is $\frac{3}{22}$; find the 4^{th} term.

2012

Q. Find the sum to 20 terms of an A.P. whose 4^{th} term is 7 and 7^{th} term is 13.
Q. If p^{th} term of an A.P. is q and qth term is p, prove that the $(p+q)^{th}$ term is $\frac{pq}{p+q}$

2013

Q. Which term of the sequence 18, 12, 8, . . . $\frac{512}{729}$?
Q. Prove that a, b, c are in either A.P. or G.P. or H.P according as $\frac{a-b}{b-c} = \frac{a}{a}, \frac{a}{b}, \frac{a}{c}$
Q. Insert four H.Ms between 12 and $\frac{48}{5}$.

2014

Q. For what value of $'n'$ so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may become the arithmetic mean between 'a' and 'b'.
Q. If $\frac{1+3+5+...n\ terms}{2+4+6+...n\ terms} = 0.95, find\ 'n'$.
Q. Which term of the sequence 18, 12, 8, . . . $\frac{512}{729}$?
Q. If the sum of 8 terms of an A.P. is 64 and the sum of its 19 terms is 361, find the 9^{th} term.
Q. Find the two G.M's between 2 and -16.
Q. The sum of four terms of an A.P. is 4 and the sum of the product first and the last and the two middle terms is -38, find the A.P.

2015

Q. The pth term of an H.P. is q and the qth term is p: find (p+ q)th term.
Q. Which term of the geometric sequence 27, 18, 12 …….. is $\frac{512}{729}$?
Q. Find the 17^{th} term of an H.P. whose first two terms are 6 and 8.

CHAPTER # 07

PERMUTATIONS, COMBINATIONS AND INTRODUCTION TO THE PROBABILITY

PERMUTATIONS AND COMBINATIONS PORTION (EXERCISE: 7.1 TO 7.3)

1991

Q. In how many ways can 4 gentlemen and 2 ladies be seated at a round-table so that the ladies are not together? In how many of these ways will three particular gentlemen be next to each other?

1992

Q. Find the total number of ways in which 5 birds can perch on 4 trees, when there is no restriction to the choice of a tree. In how many of these ways will one particular bird be alone on the tree?

1993

Q. How many different words can be found from the letter of the word INSTITUTION all taken together?

Q. A party of 7 member is to be chosen from a group of 7 gents and 5 ladies. In how many ways can the party be formed if it is to contain:
(i) exactly 4 ladies (ii) at least 4 ladies (iii) at most 4 ladies

1994

Q. In how many ways can a hockey eleven be chosen out of 15 players? If:
(i) include a particular player (ii) exclude a particular player

1995

Q. How many different natural numbers can be formed by using the digits 0,1,2,3,4,5 lying between 100 and 1000?

1996

Q. Nine tennis teams play friendly matches each team has to play against each other. how many matches have to be played in all?

Q. The numbers of arrangement of the word SUCCESS are:
(i) 420 (ii) 5040 (iii) 120 (iv) 210

1997

Q. If $\mathbf{6300} = \binom{\mathbf{10}}{\mathbf{4}, n}$, then find n.

Q. A father has 8 children. He takes them, three at a time, to a zoo as often as he can without taking the same 3 children more than once. How often will he go and how often will each child go?

1998

Q. A department in a college consists of 6 professors and 8 students. A study tour is to be arranged. In how many ways can a party of seven members be chosen so as to include:
(i) exactly 4 professors (ii) at least 4 professors

1999

Q. A team of 14 players is to be formed out of 20 players. In how many ways can the selection be made if a particular player is to be:

(i) included (ii) excluded

2000

Q. In how many ways can 5 essential prayers be offered each on a different mosque out of seven mosques in the area?

Q. In how many ways can troop of five soldiers be formed out of seven soldiers?

2001

Q. There are seven mosques in a locality. In how many ways can Aslam offer five prayers (obligatory) in different mosques such that: (i) Zohar prayer is offered in the mosque A
(ii) Zohar prayer is not offered in the mosque A

2002

Q. In how many ways can 3 books of Mathematics, 2 books of Physics and 2 books of Chemistry be places on a shelf so that the books of the same subject always remain together?

2003

Q. How many different natural numbers of 3 different digits each can be formed from the digits 1,2,3,4,5,7,9 if each number is to be: (i) odd (ii) even?

2004

Q. In how many ways can 3 English, 3 Sindhi and 2 Urdu books be arranged on a shelf so as to have all the books in the same language together?

Q. Find n and r if ${}^{n}p_{r} = 240$ and ${}^{n}C_{r} = 120$.

2005

Q. How many natural numbers may be formed by using 4 out of 1, 2, 3, 4, 5:
(i) If the digits are not repeated?
(ii) If the digits may be repeated?
(iii) How many of them are even if the digits are not repeated?

2006

Q. In a class there are 8 boys and 5 girls. Two class representatives are to be chosen from them. In how many ways can they be selected if:
(i) Both are chosen from all?
(ii) One is to be a boy and the other a girl?
(iii) The first is to be a boy and the second either a boy or a girl?

2007

Q. How many natural numbers of four digits can be formed with four digits 2,3,5,7 when no digit is being used more than once in each number? What will be the numbers if the given digits are 2,3,5,0?

Q. In how many ways can three books on Chemistry, 2 books on Physics and 2 books on Mathematics be placed on a shelf such that the books on the same subject always remain together?

2008

Q. How many different natural numbers of 3 digits can be formed from the digits 1,2,3,4,5,7, if each number is to be (i) odd (ii) even?

2009

Q. In how many ways can 3 English, 3 Sindhi and 2 Urdu books be arranged on a shelf so as to have all the books in the same language together?

2010

Q. In how many distinct ways can the letters of the word INTELLIGENCE be arranged?

Q. A father has 8 children. He takes them, three at a time, to a zoo as often as he can without taking the same 3 children more than once. How often will he go and how often will each child go?

2011

Q. If ${}^{n}P_3 = 12\ {}^{\frac{n}{2}}P_3$, find n.

2012

None

2013

Q. In how many ways can 3 books of Mathematics, 2 books of Physics and 2 books of Chemistry be places on a shelf so that the books of the same subject always remain together?

2014

Q. In how many distinct ways can the letters of the word PAKPATTAN be arranged?

2015

Q. Find n, If ${}^{n}P_4 = 24\ {}^{n}C_5$

Q. In how many ways can 3 English, 3 Sindhi and 2 Urdu books be arranged on a shelf so as to have all the books in the same language together?

INTRODUCTION TO PROBABILITY PORTION
(EXERCISE: 7.4, 7.5)

1991

Q. The dice are rolled once. Find the probability of getting a multiple of 3 or a sum of 10.

1992

Q. A committee of 4 members is to be chosen by lot from a group of 7 men and 5 women. Find the probability that the committee will consist of 2 men and 2 women.

1993

Q. Out of 12 eggs, 2 are bad, from these eggs 3 are chosen at random to make a cake. What is the probability that the cake contains:

(i) exactly one bad egg (ii) at least one bad egg

1994

Q. The letters of the word MISSISSIPPI are scrambled and then arranged in some order. What is the probability that the four "IS" are consecutive letters in the resulting arrangement?

Q. A committee of 4 members is to be chosen by lot from a group of 7 men and 5 women. Find the probability that the committee will consist of 2 men and 2 women.

1995

Q. Two cards are drawn at random from a deck of well shuffled cards. Find the probability that the cards drawn are:

(i) both Kings, of different colour (ii) King and queen of spade

1996

Q. In a fruit basket there are one dozen organs and half a dozen apples. If a person has to select a fruit at random, what is the chance of its being an orange?
If the first selection was an orange, what is the chance of second selection to be an apple?

1997

Q. A committee of 4 members is to be chosen by lot from a group of 7 teachers and 5 students. Find the probability that the committee will consist of 2 teachers and 2 students.

1998

Q. The letters of the word MISSISSIPPI are scramble and then arranged in some order. What is the probability that four "Is" are consecutive letters in the resulting arrangements?

1999

Q. A coin was tossed 3 times; find the probability of getting:

(i) at least one head (ii) no tail
(iii) exactly two tails (iv) at the most two heads

2000

Q. A prize of any 4 books is to be given out of 7 Arabic and 5 French books. Find the probability that the prize will consists of 2 Arabic and 2 French books.

2001

Q. From a group of 6 men and 5 women, a committee of 4 members is to be formed. What is the probability that the committee will consist of 2 men and 2 women.

2002

Q. A room has three lamps from a collection of 12 light bulbs of which 8 are no good, a person selects three at random and put them in the sockets. What is the probability that he will have light?

2003

Q. If a die is rolled twice, what is the probability that:
(i) The sum of the points on it is?
(ii) There is at least one 5?

2004

Q. A coin is tossed twice. Find the probability of (i) at least one head, exactly one tail.

2005

Q. The probability that the principal of a college has a television is 0.6, a refrigerator 0.2 and both television and refrigerator is 0.06; find the probability that the principal has at least a television or a refrigerator.

2006

Q. Of the students attending a lecture 50% could not see what was being written on the blackboard, 40% of them could not hear what the lecturer was saying: a particular unfortunate 30% of them fell into both of these categories. What is the probability that a student picked at random was able to see and hear satisfactorily?

2007

Q. A fair coin is tossed 3 times. Find the probability of getting:
(i) at least one head and (ii) at most two heads.

2008

Q. A drawer contains 50 bolts and 150 nuts. Half of the bolts and half of the nuts are rusted. If one item is chosen, what is the probability that it is either rusted or is a bolt?

Q. A fair coin is tossed 3 times, find he probability of getting:
(i) at least one head and (ii) at most two heads.

2009

Q. The probability that a man has a T.V. is 0.6, a V.C.R. is 0.2, and a T.V. and V.C.R. both is 0.04. What is the probability that the man has either a T.V. or a V.C.R.?

2010

None

2011

Q. A word consists of 5 consonants and 4 vowels. Three letters are chosen at random. What is the probability that more than one vowels will be selected?

2012

Q. Two cards are drawn at random from a deck of well shuffled cards; find the probability that the cards drawn are: (a) both aces (b) a king and a queen

2013

None

2014

None

CHAPTER # 08 MATHEMATICAL INDUCTION AND BINOMIAL THEOREM

MATHEMATICAL INDUCTION PORTION
(EXERCISE: 8.1, 8.2)

1991

Q. Prove that $2^n > n^2$, for an integral values of n > 5.

1992

Q. Show that: $3^{2n+2} - 8n - 9$ is divisible by 64, $\forall n \epsilon \mathbb{N}$.

1993

Q. Prove that: $\frac{1}{1.3} + \frac{4}{3.5} + \frac{9}{5.7} + \ldots + \frac{n^2}{(2n-1)(2n+1)} = \frac{n(n+1)}{2(2n+1)}$

1994

Q. Prove that $a + ar^2 + ar^3 + \ldots\ldots + ar^{n-1} = \frac{a(1-r^n)}{1-r}$, where $r \neq 1$.

1995

Q. Prove by Mathematical Induction that: $2^3 + 3^3 + 6^3 + \ldots + (2n)^3 = 2n^2(n+1)^2$, $\forall n \epsilon \mathbb{N}$

1996

None

1997

Q. Prove the following preposition by mathematical induction: $2! > 2^n$, $\forall\ n \in N$, $n \geq 4$.

1998

Q. By the principle of mathematical induction show that $(2^{3n+2} - 28n - 4)$ is divisible by 49, $\forall n \epsilon \mathbb{N}$.

1999

Q. Use mathematical induction to prove that:

$$2^2 + 4^2 + 6^2 + 8^2 + \ldots\ldots\ldots + (2n)^2 = \frac{2}{3} n (n+1)(2n+1)$$

2000

Q. Prove the following proposition by using method of Mathematical induction:

$$2 + 6 + 12 + \ldots\ldots\ldots\ldots\ldots + n(n+1) = \frac{1}{3} n (n+1)(n+2)$$

2001

Q. Prove the mathematical induction that:

$$2 + 5 + 8 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots + (3n-1) = \frac{n}{2}(3n+1)$$

2002

Q. Prove the following proposition by the method of Mathematical Induction:

$(3^{2n+2} - 28 - 4)$ is divisible by 49, $\forall\ n \epsilon \mathbb{N}$

2003

Q. Prove the mathematical induction that $10^n + 3.4^{n+2} + 5$ is divisible by 9, $\forall\ n \epsilon \mathbb{N}$.

2004

Q. Prove by mathematical induction that:

$$1.3 + 2.4 + 3.5 + \ldots\ldots\ldots + n(n+2) = \frac{1}{6} n(n+1)(2n+7)$$

2005

Q. Prove by mathematical induction: $(a^{2n} - b^{2n})$ is divisible by (a – b) for all $n \epsilon \mathbb{N}$.

2006

Q. Prove by mathematical induction:

$$1^2 + 3^2 + 5^2 + \text{--------} + (2n - 1)^2 = \frac{1}{3}n\,(2n - 1)\,(2n + 1)$$

2007

Q. Use mathematical induction to prove that:

$$1^2 + 2^2 + 3^2 + \text{-------} + n^2 = \frac{1}{6}\,n(n+1)\,(2n+1)$$

2008

Q. Prove that 2 + 4 + 6 + ……. + 2n = n (n + 1), for all natural numbers of "n".

2009

Q. Prove the following proposition by the principle of Mathematical Induction:

$$2 + 6 + 12 + \,.\;.\;.\, + n(n+1) = \frac{1}{3}n(n+1)(n+2)$$

2010

Q. Prove by mathematical induction:

$10^n + 3.4^{n+2} + 5$ is divisible by 9, $\forall\ n \in \mathbb{N}$.

2011

Q. Prove the following proposition by the principle of Mathematical Induction:

$$2 + 6 + 12 + \,.\;.\;.\, + n(n+1) = \frac{1}{3}n(n+1)(n+2)$$

2012

Q. Prove by mathematical Induction that: $1^2 + 2^2 + 3^2 + \text{-------} + n^2 = \frac{1}{6}\,n(n+1)\,(2n+1)$

OR $2^{3n+2} - 28n - 4$ is divisible by 49, $\forall\ n \in \mathbb{N}$

2013

Q. Use mathematical induction to prove that:

$$1^2 + 2^2 + 3^2 + \text{-------} + n^2 = \frac{1}{6}\,n(n+1)\,(2n+1)$$

2014

Q. Prove the following proposition by the principle of Mathematical Induction:

$$2 + 6 + 12 + \,.\;.\;.\, + n(n+1) = \frac{1}{3}n(n+1)(n+2), \forall\ n \in \mathbb{N}$$

Q. Prove by mathematical induction: $10^n + 3.4^n + 2 + 5$ is divisible by 9, $\forall\ n \in \mathbb{N}$.

2015

Q. Prove by mathematical Induction that: $2^3 + 4^3 + 6^3 + \,.\;.\;.\, + (2n)^3 = 2[n(n+1)]^2$

OR $2^{3n+2} - 28n - 4$ is divisible by 49, $\forall\ n \in \mathbb{N}$

THE BINOMIAL THEOREM (OMER KHAYAM THEOREM) (EXERCISE: 8.3 TO 8.5)

1991

Q. If y = $\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+\ldots$, prove that: $y^2+2y-7=0$

1992

Q. If 'a' be a quantity so small that a^3 may be neglected in comparison with b^3, prove that

$$\sqrt{\frac{b}{a+b}}+\sqrt{\frac{b}{b-a}}=2+\frac{3a^2}{4b^2}$$

1993

Q. Sum the series: $1-\frac{3}{2}.\frac{1}{2}+\frac{2.5}{3.6}.\frac{1}{2^2}-\frac{2.5.8}{3.6.9}.\frac{1}{2^3}+\ldots$

1994

Q. Find the middle term in $\left(x-\frac{1}{x}\right)^8$.

Q. If 'l' be a quantity so small that a^3 may be neglected in comparison with c^3, prove that

$$\sqrt{\frac{c}{l+c}}+\sqrt{\frac{c}{c-l}}=2+\frac{3l^2}{4c^2}$$

1995

Q. Identify the series $1+\frac{1}{4}+\frac{1.3}{4.6}+\frac{1.3.5}{4.6.8}+\ldots$ as binomial expansion and find the its sum.

1996

None

1997

Q. If |x|<1, prove that: $\frac{(1+x)^{\frac{1}{2}}+(1-x)^{\frac{2}{3}}}{1+x+(1-x)^{\frac{1}{2}}}=1-\frac{5x}{6}$

Q. Identify the series $1+\frac{3}{2}.\frac{1}{2}+\frac{2.5}{3.6}.\frac{1}{2^2}-\frac{2.5.8}{3.6.9}.\frac{1}{2^3}+\ldots$ as binomial expansion and find the its sum.

1998

Q. Write the general term in the expansion of $(a+b)^n$. What are the middle terms in the expansion of:

(i) $\left(x^2+\frac{1}{x}\right)^7$ (ii) $\left(x+\frac{1}{x}\right)^8$

1999

Q. Using Binomial Theorem, write the term independent of x in the expansion of $\left(\frac{4x^2}{3}-\frac{3}{2x}\right)^9$ and simplify it.

2000

Q. By using the general term in the expansion of $(a+b)^n$, find the term independent of x in $\left(x-\frac{1}{2x}\right)^8$. Point out the middle term also.

2001

Q. Find the two middle terms of $\left(\frac{2x}{3y}-\frac{3y}{2x}\right)^7$ using the general term.

Q. Show that: $\sqrt[3]{4}=1+\frac{1}{4}+\frac{1.3}{4.6}+\frac{1.3.5}{4.6.8}+\ldots$

2002

Q. When x is so small so that its square and higher power may be neglected, find the value of: $\frac{\left(1+\frac{2}{3x}\right)^5+\sqrt{4+2x}}{\sqrt{(4+x)^3}}$

Q. Using the general term binomial theorem, determine the term independent of x in the expansion of $\left(\frac{2}{3x^2}-\frac{1}{3x}\right)^8$.

2003

Q. Find the first negative term in the expansion of $(1+2x)^{\frac{7}{2}}$, using the formula for general term.

Q. Identify the following series as binomial expansion and fid its sum:
$1+\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+\dots$

2004

Q. Find the term independent of x in the expansion of $\left(x-\frac{2}{x}\right)^{10}$ by using the general term formula.

Q. Evaluate to four decimal places the expansion of $(1.03)^{\frac{1}{3}}$.

2005

Q. If x = 3y + 6y^2 + 10y^3 + . . . then prove that: y = $\frac{1}{3}x-\frac{1.4}{3^2 2!}x^2+\frac{1.4.7}{3^3 3!}x^3+\dots$

2006

Q. If x = $\frac{1}{3}+\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+\dots$, prove that: x^2+2x-2 = 0.

Q. Use the binomial theorem to find the value of $(1.01)^6$.

2007

Q. If |x|<1, prove that: $\frac{(1+x)^{\frac{1}{2}}+(1-x)^{\frac{2}{3}}}{1+x+(1+x)^{\frac{1}{2}}}=1-\frac{5x}{6}$

Q. Using the general term binomial theorem, determine the term independent of x in the expansion of $\left(x-\frac{1}{2x}\right)^{10}$.

2008

Q. Find the first negative term in the expansion of $(1+2x)^{\frac{5}{2}}$

Q. If y = 2x + 3x^2 + 4x^3 + . . . then show that: $x=\frac{y}{2}-\frac{1.3}{2^2 2!}y^2+\frac{1.3.5}{2^3 3!}y^3+\frac{1.3.5.7}{2^4 4!}y^4\dots$

2009

Q. If ‘x’ be a quantity so small that x^3 may be neglected in comparison with y^3, prove that

$$\sqrt{\frac{y}{y+x}}+\sqrt{\frac{y}{y-x}}=2+\frac{3x^2}{4y^2}$$

Q. Write in the simplified form the term independent of x in the expansion of $\left(x-\frac{1}{x^2}\right)^{15}$

2010

Q. Find the first negative term in the expansion of $\left(1+\frac{3}{2}x\right)^{\frac{9}{2}}$

Q. Show that: $\sqrt[3]{4}=1+\frac{1}{4}+\frac{1.3}{4.6}+\frac{1.3.5}{4.6.8}+\dots$

2011

Q. Find the term independent of in the binomial expansion of $\left(x-\frac{1}{x^2}\right)^{15}$

Q. Show that: $\sqrt{3}=1+\frac{1}{3}+\frac{1.3}{3^2 2!}+\frac{1.3.5}{3^2 3!}+\dots$

2012

Q. If |x|<1, prove that: $\frac{(1+x)^{\frac{1}{2}}+(1-x)^{\frac{2}{3}}}{1+x+(1+x)^{\frac{1}{2}}}=1-\frac{5x}{6}$

OR Q. Find the first negative term in the expansion of $(1+2x)^{\frac{5}{2}}$

2013

Q. Identify the series as binomial expansion and find the its sum: $1+\frac{3}{2}.\frac{1}{2}+\frac{2.5}{3.6}.\frac{1}{2^2}-\frac{2.5.8}{3.6.9}.\frac{1}{2^3}+...$

Q. If 'c' be a quantity so small that c^3 may be neglected in comparison with l^3, prove that

$$\sqrt{\frac{l}{l+c}}+\sqrt{\frac{l}{l-c}}=2+\frac{3l^2}{4c^2}$$

Q. Write in the simplified the term involving x^{10} in the expansion of $\left(x^2-\frac{1}{x^3}\right)^{10}$

2014

Q. Write the term independent of x in the expansion of $\left(2x+\frac{1}{3x^2}\right)^9$.

Q. Show that: $\sqrt[3]{4}=1+\frac{1}{4}+\frac{1.3}{4.6}+\frac{1.3.5}{4.6.8}+...$

Q. If |x|<1, prove that: $\frac{(1+x)^{\frac{1}{2}}+(1-x)^{\frac{2}{3}}}{1+x+(1+x)^{\frac{1}{2}}}=1-\frac{5x}{6}$

2015

Q. Using Binomial Theorem, write the term independent of x in the expansion of $\left(\frac{4x^2}{3}-\frac{3}{2x}\right)^9$

Q. If 'c' be a quantity so small that c^3 may be neglected in comparison with l^3, prove that

$$\sqrt{\frac{l}{l+c}}+\sqrt{\frac{l}{l-c}}=2+\frac{3c^2}{4l^2}$$

CHAPTER # 09 FUNDAMENTALS OF TRIGONOMETRY

1991

Q. How far does boy on a bicycle travel in 10 revolutions if the diameters of the wheels of his bicycle are equal to 56 cm each?

1992

Q. A belt 24.75 meters long passes around a 3.5 cm diameter pulley. As the belt makes 3 complete revolutions in a minute, how many radians does the wheel turn in one second?

1993

Q. If a point on rim of 21cm diameter fly wheel travel 5040 cm in a minute, through how many degrees does the wheel turn in one second?

1994

Q. If tanθ = $\sqrt{\frac{3}{5}}$ and $\rho(\theta)$ is in the third quadrant, draw unit circle to show $\rho(\theta)$ and find the remaining trigonometric functions.

1995

Q. (i) Convert $\frac{\pi}{3}$ radians into degrees. (ii) Convert $24^0 36^0 30''$ into radian.

Q. If secθ =$\sqrt{2}$ and $\rho(\theta)$ is in fourth quadrant, find the remaining trigonometric functions.

1996

Q. If the area of the circle is 385 sq. units, find its diameter.

Q. If $\theta = \frac{\pi}{6}$, find the value of all trigonometric functions and hence prove that:

$$sin^2\frac{\pi}{6}\ cos\frac{\pi}{6} + tan\frac{\pi}{6}\ cot\frac{\pi}{6} = 8 + \frac{\sqrt{3}}{8}$$

1997

Q. If cosθ = $\frac{2}{\sqrt{5}}$ and sinθ < θ then find the value of sinθ.

1998

Q. A belt 24.75 meters long passes around a 2.5 cm diameter pulley. As the belt makes 4 complete revolutions in a minute; find the number of radians through which the wheel turns is one second.

Q. If tan θ = $\frac{3}{4}$ and $\rho(\theta)$ is in the third quadrant; find the values of other trigonometric functions.

1999

Q. How far does a boy travel on a bicycle in 15 revolutions if the diameter of each of the wheels is 14 cm?

Q. If $\sin\theta = -\frac{\sqrt{3}}{2}$; $\rho(\theta)$ lies in the third quadrant, find all the remaining Trigonometric functions.

2000

Q. If $\sin\theta = \frac{4}{5}$ and $\rho(\theta)$ is not in the first quadrant, then find the values of all the remaining trigonometric functions.

2001

Q. If $\tan\theta = \frac{3}{4}$ and $\rho(\theta)$ is in the 3rd quadrant, find the remaining trigonometric functions, using the definition of radian function with $x^2 + y^2 = 1$.

Q. Find the arc length of a circle whose diameter is 28 cm and whose central angle is of measure 41^o.

2002

Q. If $\tan\theta = \frac{5}{12}$ and $\rho(\theta)$ is not in the third quadrant, find of remaining trigonometric functions, using the definition of radian function with $x^2 + y^2 = 1$.

Q. A belt 24.75 meters long passage around a 3.5 cm diameter pulley. As the belt makes 3 complete revolutions in a minute, how many radians does the wheel turn in one second?

2003

Q. A belt 23.85 meters long passes around 1.58cm diameter pulley. If the belt makes two complete revolutions in a minute how many radians does the wheel turn in one second?

Q. If $\cot\theta = -2$ and $\rho(\theta)$ is in the second quadrant, find the values of all the trigonometric functions by using the definition of radian function.

2004

Q. How far does a boy on a bicycle travel in 12 revolutions if the diameter of the wheel of his bicycle is each equal to 56 cm?

Q. If $\tan\theta = -\frac{1}{3}$ and $\sin\theta < \theta$, find the values of all trigonometric functions by using the definition of radian function.

2005

Q. If $\tan\theta = -\frac{4}{3}$ and $\rho(\theta)$ is not in the second quadrant, use radian function to find the remaining trigonometric functions.

2006

Q. Find the remaining trigonometric function if $\tan\theta$ is negative and $\sin\theta = \frac{3}{5}$.

2007

Q. If $\tan\theta = -\frac{1}{3}$ and $\rho(\theta)$ is not in the 2nd quadrant , find the remaining trigonometric function using the definition of radian function $x^2 + y^2 = 1$.

Q. A belt 24.75 meters passes around a 3.5 cm diameter pulley as the belt makes 3 complete revolutions in a minute. How many radians does wheel turn in a second?

2008

Q. Find the remaining trigonometric functions if $\cot\Theta = 3$ and $\sin\Theta$ is positive.

2009

Q. If a point on the rim of a 21 cm diameter flywheel travels 5040 meters in a minute, through how many radians does the flywheel turn in one second?

Q. Using the definition of radian function, find the value of the remaining trigonometric function if $\cos\theta = -\frac{3}{5}$ and $\rho(\theta)$ is in the 3rd quadrant.

2010

Q. If $\tan\theta = \frac{1}{2}$, find the remaining trigonometric functions when 'θ' lies in the 3rd quadrant.

Q. A belt 24.75 metre long passes over a 1.5 cm diameter pulley. As the belt makes two complete revolutions in a minute, how many radians does the wheel turn in one second?

2011

Q. If a point on the rim of a 21 cm diameter flywheel travels 5040 meters in a minute, through how many radians does the flywheel turn in one second?

Q. If $= \frac{3}{4}$ and $\rho(\theta)$ is in 3rd quadrant. Find the remaining trigonometric functions by using the definition of radian function.

2012

Q. If $tan\theta = -\frac{1}{3}$ and $sin\theta$ is negative find the remaining trigonometric functions using the definition of radian function.

Q. If a point on the rim of a 21 cm diameter flywheel travels 5040 meters in a minute, through how many radians does the flywheel turn in one second?

2013

Q. A belt 24.75 meters long passes around a 3.5 cm diameter pulley. As the belt makes three complete revolutions in a minute, how many radians does the wheel turn is one second.

Q. If $cot\theta = 3$ and $sin\theta$ is positive, find the values of all trigonometric functions by using the definition of radian function.

2014

Q. If a point on the rim of a 21 cm diameter flywheel travels 5040 meters in a minute, through how many radians does the flywheel turn in one second?

Q. If $cosec\theta = -\frac{3}{2}$ and $\rho(\theta)$ is in the fourth quadrant, then find he remaining trigonometric functions using the definition of the radian function with $x^2 + y^2 = 1$.

2015

Q. How far does a boy travel on a bicycle in 10 revolutions if the diameter of each of the wheels is 56 cm?

Q. Using the definition of the radian function, find he remaining trigonometric functions if $cos\theta = \frac{1}{2}$ and $tan\theta$ is positive.

CHAPTER # 10 TRIGONOMETRIC IDENTITIES

1991

Q. Prove that $\tan(\alpha - \beta) = \dfrac{\tan\alpha - \tan\beta}{1+\tan\alpha.\tan\beta}$

Q. $\dfrac{\cot\theta + \operatorname{cosec}\theta}{\sin\theta + \tan\theta} = \operatorname{cosec}\theta\cot\theta$

Q. $\cos 4\theta = 8\cos^4\theta - 8\cos^2\theta + 1$

Q. $\dfrac{\sin 7\theta - \sin 5\theta}{\cos 7\theta + \cos 5\theta} = \tan\theta$

1992

Q. Prove that $\sin u + \sin v = 2\sin\left(\dfrac{u+v}{2}\right)\cos\left(\dfrac{u-v}{2}\right)$

Q. $\sin^6\theta - \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

Q. $\tan(\alpha + \beta) = \dfrac{\tan\alpha + \tan\beta}{1 - \tan\alpha.\tan b}$

Q. $1 + \cos 2\theta = \dfrac{2}{1+\tan^2\theta}$.

1993

Q. If $\tan\alpha = \frac{\sqrt{3}}{4} - \sqrt{3}$ and $\tan\beta = \frac{\sqrt{3}}{4} + \sqrt{3}$, prove that $\tan(\alpha + \beta) = 0.375$

Q. Prove that: $\tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right) = \sqrt{\frac{1+\sin\theta}{1+\sin\theta}} = \sec\theta + \tan\theta$

1994

Prove that:

Q. Express $\sin\theta\cos 3\theta$ in the sum form and prove that $\sin 15^0\cos 45^0 = \frac{\sqrt{3}-1}{4}$

Q. Prove that: (i) $\sin 2\theta = \sin\theta\cos\theta$ (ii) $\cos 2\theta = \cos^2\theta - \sin^2\theta$

1995

Q. $\dfrac{\sin\theta}{1-\cot\theta} + \dfrac{\cos\theta}{1-\tan\theta} = \cos\theta + \sin\theta$ and hence verify the result if $\theta = 2\frac{\pi}{3}$

Q. Prove that: $\dfrac{\sin 7\theta - \sin 5\theta}{\cos 7\theta + \cos 5\theta} = \tan\theta$

1996

Q. $\sin 5\theta - \sin 3\theta + \sin 2\theta = 4\sin\theta\cos 3\frac{\theta}{2}\cos 5\frac{\theta}{2}$

Q. $\dfrac{\tan\theta + \sin\theta}{\sin\theta - \tan\theta} = \sec\theta.\dfrac{1+\cos\theta}{1-\sec\theta}$ $(\sec\theta \neq 1)$

1997

Q. Express $\cos\theta$ in terms of $\cot\theta$.

Q. Prove that the points A(6, 13), B(5, 7) and C(4, 1) are collinear.

Q. $\dfrac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta - 1} + \dfrac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta + 1} = 2\sec^2\theta$

Q. $\dfrac{1+\cos\theta}{1-\cos\theta} = \cot\frac{\theta}{2}$

Q. $\cos\alpha\ \cos(\alpha - \beta) + \sin\alpha\sin\propto(\propto - \beta) = \cos\beta$

1998

Q. Prove That: $\dfrac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \dfrac{\cot\theta - 1}{\cot\theta + 1}$

Q. $\tan(\alpha - \beta) = \dfrac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$

Q. $\frac{\sin 2\theta}{\sin\theta} - \frac{\cos 2\theta}{\cos\theta} = \sec\theta$

Q. $\sin u + \sin v = 2\sin\frac{u+V}{2}\cos\frac{u-V}{2}$

Q. $\frac{\sin\theta + \sin 3\theta + \sin 5\theta}{\cos\theta + \cos 3\theta + \cos 5\theta} = \tan 3\theta$

1999

Q. $\frac{\cot\theta + \operatorname{cosec}\theta}{\sin\theta + \tan\theta} = \operatorname{cosec}\theta + \cot\theta$

Q. $\frac{\tan\left(\frac{A+B}{2}\right)}{\tan\left(\frac{A-B}{2}\right)} = \frac{\sin A + \sin B}{\sin A - \sin B}$

Q. $\frac{\sin\theta}{1-\cot\theta} + \frac{\cos\theta}{1-\tan\theta} = \cos\theta + \sin\theta$

2000

Q. Show that (0, 0) (a, 0), (b, c) and (b – a, c) taken in order form the vertices of a parallelogram.

Q. $\cos 4\theta = 8\cos^4\theta - 8\cos^2\theta + 1$

Q. $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$, $\sin\theta \neq -1$

Q. $\cos\alpha\cos(\alpha - \beta) + \sin\alpha\sin(\alpha - \beta) = \cos\beta$

2001

Q. $\frac{\sin\theta}{1-\cot\theta} + \frac{\cos\theta}{1-\tan\theta} = \cos\theta + \sin\theta$

Q. $\frac{\sin\alpha - \sin\beta}{\sin\alpha + \sin\alpha\beta} = \frac{\tan\left(\frac{\alpha-\beta}{2}\right)}{\tan\left(\frac{\alpha+\beta}{2}\right)}$

Q. $\sin(\alpha+\beta)\sin(\alpha-\beta) = \sin^2\alpha - \sin^2\beta$

2002

Q. $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$

Q. $\sin 7\theta - \sin 5\theta + \sin 2\theta = 4\sin\theta\cos\frac{7\theta}{2}\cos\frac{5\theta}{2}$

Q. $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$

2003

Q. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \operatorname{cosec}\theta - \cot\theta$

Q. $\tan\frac{\theta}{2} = \frac{\sin\theta}{1+\cos\theta} = \frac{1-\cos\theta}{\sin\theta}$

Q. $\sin 6\theta - \sin 4\theta + \sin 2\theta = 4\sin\theta\cos 2\theta\cos 3\theta$

2004

Q. $\cos(\alpha+\beta)\cos(\alpha-\beta) = \cos^2\alpha - \sin^2\beta$

Q. $\cos 4\theta = 8\cos^4\theta - 8\cos^2\theta + 1$

Q. $\frac{\tan\theta + \sin\theta}{\operatorname{cosec}\theta + \cot\theta} = \tan\theta\sin\theta$

2005

Q. $\sin^6\theta - \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

Q. $\tan\frac{\theta}{2} = \frac{1-\cos\theta}{\sin\theta}$

Q. $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$

2006

Q. Express all the trigonometric functions in terms of cosecθ.

Q. $\sin^6\theta - \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

Q. $\cos(\theta+\emptyset)\cos(\theta-\emptyset) = \cos^2 - \sin^2\emptyset$

Q. $\cos 4\theta = 8\cos^4\theta - 8\cos^2\theta + 1$

2007

Q. $cos4\theta = 8cos^4\theta - 8cos^2\theta + 1$

Q. $\frac{\sin 3\theta}{cos\theta} + \frac{\cos 3\theta}{sin\theta} = 2cosec\theta$

Q. $\frac{sin\theta}{1+cos\theta} + \frac{1+cos\theta}{sin\theta} = 2cosec\theta$

2008

Q. $\tan 3\theta = \frac{3\tan\theta - \tan^3\theta}{1-3\tan^2\theta}$

Q. $\frac{Sin2\theta}{Sin\theta} - \frac{Cos2\theta}{Cos\theta} = \sec\theta$

Q. $\frac{Sin7\theta - Sin5\theta}{Cos7\theta + Cos5\theta} = \tan\theta$

Q. If $\alpha = \frac{\sqrt{3}}{2}$ and $\beta = \frac{1}{\sqrt{2}}$ and both $\rho(\alpha)$ and $\rho(\beta)$ are in the first quadrant find the value of $\sin(\alpha+\beta)$.

2009

Q. $\frac{1}{1-sin\theta} + \frac{1}{1+sin\theta} = 2sec^2\theta$

Q. $cos(\alpha+\beta)cos(\alpha-\beta) = cos^2\alpha - sin^2\beta$

Q. $cos4\theta = 8cos^4\theta - 8cos^2\theta + 1$

2010

Q. Prove any Two of the following:

a) $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$ b) $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$

c) $\tan\frac{\theta}{2} = \frac{1-\cos\theta}{\sin\theta}$

Q. Show that the point, (2, 1), (5, 1), (2, 6) are the vertices of a right-angled triangle.

2011

Q. Prove any Two of the following:

Q. $\frac{cot\theta + \text{cosec}\,\theta}{\sin\theta + \tan\theta} = cosec\theta cot\theta$

Q. $cos4\theta = 8cos^4\theta - 8cos^2\theta + 1$

Q. $\frac{sin 7\theta - sin 5\theta}{cos 7\theta + cos 5\theta} = tan\theta$

2012

Q. Prove any Two of the following:

(a) $\frac{tan\,\theta + \sin\theta}{cosec\,\theta + \cot\theta} = tan\theta . sin\theta$ (b) $cos3\theta = 4cos^3\theta - 3cos\theta$

(c) $\frac{\sin(\theta+\varphi)}{cos\theta cos\varphi} = tan\theta + tan\varphi$ (d) $\frac{sin 2\theta}{sin\theta} - \frac{cos 2\theta}{cos\theta} = sec\theta$

2013

Q. Prove any Two of the following:

(a) $\frac{1+sec\theta}{1-sec\theta} = \frac{tan\,\theta + \sin\theta}{sin\theta - \tan\theta}$ (b) $cos3\theta = 4cos^3\theta - 3cos\theta$

(c) $\sin 5\theta - \sin 3\theta + \sin 2\theta = 4\sin\theta\cos\frac{3\theta}{2}\cos\frac{5\theta}{2}$

2014

Q. Prove any Two of the following:

(a) $\frac{1}{1-sin\theta} + \frac{1}{1+sin\theta} = 2\sec^2\theta$ (b) $cos3\theta = 4cos^3\theta - 3cos\theta$

(c) $\tan 57^0 = \frac{\sqrt{3}\cos 3^0 - \sin 3^0}{\cos 3^0 + \sqrt{3}\sin 3^0}$

2015

Q. Prove any Two of the following:

(a) $\frac{\cot\theta + cosec\theta}{\sin\theta + \tan\theta} = cosec\theta\cot\theta$ (b) $\frac{\sin(\theta+\emptyset)}{\cos\theta\cos\emptyset} = \tan\theta + \tan\emptyset$

(c) $\cot(\alpha+\beta) = \frac{\cot\alpha\cot\beta - 1}{\cot\alpha + \cot\beta}$

Q. If $\sin\alpha = \frac{\sqrt{3}}{2}$ and $\cos\beta = \frac{1}{\sqrt{2}}$, both $\rho(\alpha)$ and $\rho(\beta)$ lie in the first quadrant, find the value of $\tan\rho(\alpha+\beta)$

CHAPTER # 11 GRAPHS OF TRIGONOMETRIC FUNCTIONS

1991

Q. Draw the graph of $cos^{-1}y$

1992

Q. Draw the graph of $y = tanx$, where $-\frac{\pi}{2} < x < \pi, x \neq \frac{\pi}{2}$

1993

Q. Draw the graph of $y = arc\ cosx$, where $-1 \leq x \leq 1$

1994

Q. Draw the graph of $y = tanx$, where $-\frac{\pi}{2} < x < \pi, x \neq \frac{\pi}{2}$

Q. Show that the function $sinx + cosx$ is of period 2π.

Also prove that sinx+cosx = $\sqrt{2}sin\left(x + \frac{\pi}{4}\right)$

1995

Q. Draw the graph of $y = cos\frac{\theta}{2}$ for $-2\pi \leq x \leq 2\pi$

1996

Q. Draw the grapy of cos 2 θ , where 0 < θ $\leq$ π.

1997

Q. Draw the graph of the function y = sin (-θ) , - 180^{o} < 0 < 180^{o} and find the value of sin (65^{0}) from the graph.

1998

Q. Draw the graph of y = cos $\frac{\theta}{2}$ for – 2 $\pi \leq \theta \leq$ 2 π

1999

Q. Draw the graph of cos θ when - $\pi \leq$ 0 $\leq \pi$

2000

None

2001

Q. Draw the graph of y = sin 2θ, where $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$.

2002

Q. Draw the graph of y = tan x for – 90^{o} < x < 90^{o}.

2003

Q. Draw the graph of y = sin 2x, where - $\pi \leq$ x $\leq$ π. From the graph find the value of sin 140^{o}.

2004

None

2005

Q. Draw the graph of y = cos2x, when $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$.

2006

Q. Find the period of $\frac{1}{2}sin^2x$.

2007

Q. Draw the graph of $\frac{1}{2}cos\theta$ if - $\pi \leq \theta \leq \pi$.

2008

Q. Sketch the graph of sinϴ, where $0 \leq \Theta \leq 2\pi$.

2009

Q. Draw the graph of sinθ when $0 \leq \theta \leq \frac{\pi}{2}$.

2010

Q. Draw the graph of cos2x, where $-\pi \leq x \leq \pi$.

2011

Q. Draw the graph of sinx when $-180^0 \leq \theta \leq 180^0$.

2012

Q. Draw the graph of cos2 θ, when $-180^0 \leq \theta \leq -180^0$

2013

Q. Draw the graph of cos2 θ, when $-180^0 \leq \theta \leq -180^0$

2014

Q. Draw the graph of $sin\theta$, when $-\pi \leq \theta \leq \pi$.

2015

Q. Draw the graph of $sin\theta$, when $0 \leq \theta \leq 2\pi$.

CHAPTER # 12 SOLUTIONS OF TRIANGLES

1991

Q. An aeroplane is flying at a height of 9000 meters. If the angle of depression to a field marker is 23^{o}, find the aerial distance.

Q. A plane is heading due east at 675 km/h. A wind is blowing in from the north-east at 75 km/h; find the direction of the plane and it ground speed.

Q. If the measure of the two sides of a triangle are 4 and 5 un find the third side so that the area of the triangle is 6 sq. units.

Q. Show that $r_1 = 4R\ Sin\frac{\alpha}{2}\ Cos\frac{\beta}{2}\ Cos\frac{\gamma}{2}$

1992

Q. A man observes that the angle of elevation of the top of a mountain is 50^{o} from a point on the ground. On walking 150 meters away from the point, the angle of elevation becomes 40.45^{o}. Find the height of the mountain.

Q. The three sides of the triangular lot have lengths 9, 12 and 16cm respectively. Find the measure of its largest angle and the area of the lot.

Q. Two hikers, start from the same point, one walk 9km heading east, the other 10km heading 42^{0} east (42^{0} towards east from north). How far apart are they at the end of their walks?

1993

Q. Prove the law of tangents in the form: $tan\frac{\gamma-\alpha}{2} = \frac{c-a}{c+a}tan\frac{\gamma+\alpha}{2}$

Q. Show that $r_1 = (s-c)\cot\frac{\beta}{2} = 4R\ \ Sin\frac{\alpha}{2}\ Cos\frac{\beta}{2}\ Cos\frac{\gamma}{2}$

Q. At a certain point the angle of elevation of a tower is found to be $tan^{-1}\left(\frac{4}{5}\right)$. On walking 32 feet directly towards the tower, the angle of elevation becomes $tan^{-1}\left(\frac{5}{2}\right)$. Find the height of the tower.

1994

Q. Two hikers, start from the same point, one walk 9km heading east, the other 10km heading 42^{0} east (42^{0} towards east from north). How far apart are they at the end of their walks?

Q. Prove that $r_3 = \frac{\Delta}{s-c}$, where r_3 is the radius of the circle opposite to the vertex C of a triangle ABC.

1995

Q. State and prove the law of cosine.

Q. Solve the triangle ABC in which a=40.1cm, b=20cm and $\gamma = 50^{0}$. Hence find the area of the triangle.

Q. Find the value of R and r in the triangle ABC where a=2cm, b=3cm and c=4cm.

1996

Q. Show that in any triangle ABC, $\frac{1}{r^2} + \frac{1}{{r_1}^2} + \frac{1}{{r_2}^2} + \frac{1}{{r_3}^2} = \frac{a^2+b^2+c^2}{\Delta}$

Q. A man standing on one side of a road observes that the measure of the angle subtended by the top of a five-storey building on the opposite side of the road is 35^{o}. When the crosses the road of width 35 meters to approach the building, he finds the measure of the angle to be 65^{o}; find the height of the building and the distance of the initial position of the man from the building.

Q. Solve the triangle ABC in which $\angle B = 60^{o}$, $\angle A = 49^{o}$ and c = 39 inches.

1997

Q. Find the length of the third side of a triangular building that faces 13.6 meters along one street and 13.0 meters along another street. The angle of intersection of the two streets is 72^{o}.

Q. Prove that the area of a triangle $\triangle = \frac{1}{2}\ \frac{a^2 sin\,\alpha.\sin\beta}{sin\,\alpha}$, where $\triangle$ is the area of the given triangle ABC.

Q. Prove that $r_1 r_2 r_3 = rs^2$, where r, r_1, r_2, r_3 & s have usual meanings.

1998

Q. Prove that in any equilateral triangle r : R : r_1 = 1 : 2 : 3, where r, R and r_1 have usual meanings.
Q. Solve the triangle in which a = 15.2 cm, b = 20.9 cm and c = 34.7 cm and also find the area of the triangle.
Q. A man is standing on the bank of a river. He observes that the measure of the angle subtended by a tree on the opposite bank is 60^o, when the retreats of 40 meters from the bank, he finds the measure of the angle to be 30^o; find the height of the tree and the width of the river.

1999

Q. Prove the Law of Cosine, cos α = $\frac{b^2+c^2-a^2}{2bc}$. (Show all the working).
Q. A piece of a plastic strip 1m is bent to form an isosceles triangle with 96^o as its largest angle; find the length of the sides.
Q. Prove that $r_1 = 4R\sin\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$, where R, r_1 have their usual meanings.

2000

Q. Solve the following triangle:
a = 54^o 58′ , b = 70 cm, c = 58 cm.
Q. Prove that: $rr_1 r_2 r_3 = \triangle^2$. State also the meaning of the notations.
Q. Deduce complete the formula: $\sin\frac{\alpha}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$,Where all the letters have their usual meanings.

2001

Q. A hiker walks due east at 4 km per hour and a second hiker starting from the same point walks 55^o north-east at the rate of 6km per hour. How far apart will they be after 2 Hours?
Q. Show that in any triangle ABC, $\frac{1}{r^2} + \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} = \frac{a^2+b^2+c^2}{\Delta}$ where all the symbols have their usual meanings.
Q. Three sides of a triangular lot have lengths 14 cm, 15 cm and 16 cm; find the measure of the largest angle and the area of the lot.

2002

Q. Derive the cosine law: $a^2 = b^2 + c^2 - 2bc\cos\alpha$ for a triangle ABC.
Q. Due to the wind blowing from 37^o north-east, the pilot of an aeroplane whose airspeed is 500 km/hr has to head his plane at 325^o in order to follow a courses of 310^o; find the ground speed.
Q. Prove: $\triangle = 4Rr\cos\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$, where all the symbols have their usual meanings.

2003

Q. Prove that $\cos\frac{\alpha}{2} = \sqrt{\frac{s(s-a)}{bc}}$, where all symbols have their usual meanings in $\triangle$ ABC.
Q. Solve the triangle is $\alpha = 25^o$, a = 40cm, b = 20cm.
Q. Show that in any $\triangle$ ABC , $\frac{1}{r^2} + \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} = \frac{a^2+b^2+c^2}{\Delta}$,
where all the symbols have their usual meanings.

2004

Q. An aero plane is flying at a height of 9000 meters. If the angle of depression of a field market is 23^o, find the aerial distance.
Q. Three points A, B, C form a triangle such that the ratio of the measures of their angles is 1:2:3. Find the ratio of the lengths of the sides.
Q. Find the area a of a $\triangle$ABC in which $\alpha = 30^o$, $\beta = 63^o$ and c = 7.3 cm.
Q. Prove that $\Delta = r^2\cot\frac{\alpha}{2}\cot\frac{\beta}{2}\cot\frac{\gamma}{2}$, where the symbols have their usual meanings.

2005

Q. A man is standing on the bank of a river. He observes that are measures of the angle of elevation subtended by the tree on the opposite bank 60^0. When he retreats 40 meters from the bank, he finds the measure of the angle to be 30^0; find the height of the tree and the width of the river.

Q. Prove $\tan\frac{\beta}{2} = \sqrt{\frac{(s-a)(s-c)}{s(s-b)}}$, Where s, a, b, c have their usual meanings.

Q. If three sides of a triangle are 11 cm, 13 cm, 16 cm, find the measure of the larges angle and the area of the triangle.

Q. If a = b = c, then prove that r: R: r_1 = 1:2:3, where a, b, c, r, R_1 r_1 have their usual meanings.

2006

Q. A plan is heading due east at 675 km/h. The wind is blowing in from the north east at 75 km/h, find the direction of the plane and its ground speed.

Q. Solve the triangle ABC in which a = b = c.

Q. Show that $r_1 = 4R\, sin\frac{\alpha}{2}\, cos\frac{\beta}{2}\, cos\frac{\gamma}{2}$.

2007

Q. Prove that in any equilateral triangle r: R : r_1 = 1 : 2 : 3, where r,R,r_1 have their usual meanings.

Q. The measures of the two sides of a triangle are 4cm and 5cm, find the third side such that the area of the triangle is 6 square centimeters.

2008

Q. A man is standing on the bank of a river. He observes that are measures of the angle of elevation subtended by the tree on the opposite bank 65^0. When he retreats 35 meters from the bank, he finds the measure of the angle to be 35^0; find the height of the tree and the width of the river.

Q. Find the area of the triangle ABC, if $\alpha = 30^0$, $\beta = 63^0$ c = 7. 3 cm.

Q. Prove that $\Delta = r^2\, cot\frac{\alpha}{2}\, cot\frac{\beta}{2}\, cot\frac{\gamma}{2}$ where all notations have their usual meanings.

Q. $r_1\, r_2\, r_3 = rs^2$, where the symbols have their usual meanings.

2009

Q. Find the area of the triangle ABC when $\alpha = 51^o$, $\gamma = 61^o$, b = $\sqrt{3}$ cm.

Q. Derive the Law of Cosine.

Q. Solve the triangle ABC when $\alpha=49^o$, $\beta=60^o$, c=39 cm.

Q. If a = b = c, prove that r_1 : R : r = 3 : 2 : 1, where r_1, R and r have their usual meanings.

2010

Q. Derive the Law of Cosine.

Q. Prove that $r_2 = \frac{\Delta}{s-b}$, where all the letters have their usual meanings.

Q. Show that in any $\Delta ABC\ \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} = \frac{1}{r}$, the letters have their usual meanings.

Q. Solve the ΔABC in which a = 5 cm, b = 10 cm, c = 13 cm.

2011

Q. Solve the triangle in which a=5cm, b=10cm and c=13cm.

Q. Prove that $r_1 = 4R\, \sin\frac{\alpha}{2}\, \cos\frac{\beta}{2}\, \cos\frac{\gamma}{2}$.

Q. Derive that law of Sines.

2012

Q. Derive the law of tangents.

Q. Prove that: $\frac{1}{r^2} + \frac{1}{{r_1}^2} + \frac{1}{{r_2}^2} + \frac{1}{{r_3}^2} = \frac{a^2+b^2+c^2}{\Delta}$

2013

Q. A piece of a plastic strip 1m is bent to form an isosceles triangle with 95^o as its largest angle; find the length of the sides.

Q. Prove that $r_1 r_2 r_3 = rs^2$, where r, r_1, r_2, r_3 & s have usual meanings.

Q. Prove that in any triangle ABC, $r = \frac{\Delta}{s}$

2014

Q. The three sides of a triangular building have lengths 10cm, 11cm, 13cm respectively. Find the measure of its largest angle and the area of the building.

Q. Prove that in any triangle ABC, $R = \frac{abc}{4\Delta}$

Q. Derive the law of Cosine.

Q. Prove that: $\frac{1}{r^2} + \frac{1}{{r_1}^2} + \frac{1}{{r_2}^2} + \frac{1}{{r_3}^2} = \frac{a^2+b^2+c^2}{\Delta}$

2015

Q. Solve the triangle in which a=10cm, $\alpha = 30^0, \beta = 40^0$.

Q. Prove that $\Delta = \frac{1}{2} absin\gamma$, where Δ denotes the area of triangle ABC.

Q. Prove that $r_1 = 4R \sin\frac{\alpha}{2} \cos\frac{\beta}{2} \cos\frac{\gamma}{2}$.

Q. A man observes that the angle of elevation of the top of a mountain is 45^o from a point on the ground. On walking 100 meters away from the point, the angle of elevation becomes 43.45^o. Find the height of the mountain.

CHAPTER # 13

INVERSE TRIGONOMETRIC FUNCTIONS AND TRIGONOMETRIC EQUATIONS

1991

Q. Solve: $tan^2\theta + tan\theta = 2$

1992

Q. Verify: $\tan^{-1}\theta + \cot^{-1}\theta = \frac{\pi}{2}$

1993

Q. Prove that: $tan^{-1}\left(\frac{1}{13}\right) + tan^{-1}\left(\frac{1}{7}\right) = tan^{-1}\left(\frac{2}{9}\right)$

Q. Solve: $\sqrt{3}cos\theta + sin\theta = \sqrt{2}$

1994

Q. Find x, if $2tan^{-1}\frac{1}{3} + tan^{-1}\frac{1}{7} = tan^{-1}x$

1995

Q. Solve the equation: $2cos^2x - 5cosx + 2 = 0, \quad for\ 0^0 \le x \le 360^0$

1996

Q. Find the value of: $sin\left(arc\ sin\frac{\sqrt{3}}{2} + arc\ cos\frac{1}{2}\right) + tan\left(arc\ sin\frac{1}{2} + arc\ tan(-1)\right)$

Q. Solve the equation: $tan^2x - 1 = \frac{1}{cosx}$

1997

Q. Show that $\cot^{-1}\theta = \cos^{-1}\frac{\theta}{\sqrt{1+\theta^2}}$

Q. Solve the following trigonometric equation and write the general values of θ.

$$sin\,3\theta - sin\theta = 0$$

1998

Q. Solve: $\sin^2 x + 2\cos x + 2 = 0$

Q. Verify: $\tan^{-1}\theta + \cot^{-1}\theta = \frac{\pi}{2}$

1999

Q. Solve the equation and check: $sin\theta + cos\theta = 1$

2000

Q. Prove the following (without using tables or calculator):

$$sin\left(arcsin\frac{\sqrt{3}}{2} + arc\ cos\frac{1}{2}\right) = \frac{\sqrt{3}}{2}$$

Q. Solve following trigonometric equations: $sin\,2x - cos\,x = 0$

2001

Q. Taking principle values only and without the use of calculator and tables, prove that:

$$arcsin\frac{3}{5} + arc\ cos\frac{4}{5} = \frac{\pi}{2}$$

Q. Solve the following equation for all values of x: $\sqrt{3}sinx - cosx = 1$

2002

Q. Without using a calculator or a table, show that: $Tan^{-1}\frac{1}{7} + Tan^{-1}\frac{1}{13} = Tan^{-1}\frac{2}{9}$

Q. Solve the following trigonometric equation:

$$\sqrt{3}\,tanx - secx - 1 = 0$$

2003

Q. Without using a calculator or a table show that:

$$tan^{-1}\left(\frac{1}{7}\right) + tan^{-1}\left(\frac{1}{8}\right) = tan^{-1}\left(\frac{3}{11}\right)$$

Q. Solve the following trigonometric equation for all values of θ.

$$4 \sin^2 \theta \tan \theta + 4 \sin^2 \theta - 3 \tan \theta - 3 = 0$$

2004

Q. Show without using calculator, show that:

$$tan^{-1}\left(\frac{1}{13}\right) + tan^{-1}\left(\frac{1}{4}\right) = tan^{-1}\left(\frac{1}{3}\right)$$

Q. Solve the equation $\sqrt{3} \cos \theta + \sin \theta = 2$.

2005

Q. Prove that arc $\cos\theta$ + arc $\sin \theta = \frac{\pi}{2}$

Q. Solve and find the general solution of $\sqrt{3} \sin \theta \cos \theta - 2 = 0$.

2006

Q. Show that: $tan^{-1}\left(\frac{1}{3}\right) + \frac{1}{2}\, tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{8}$

Q. Solve: $2sin^2\theta + 2\sqrt{2}sin\theta - 3 = 0$

2007

Q. Show that: $tan^{-1}\left(\frac{1}{3}\right) + \frac{1}{2}\, tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{8}$

Q. Solve the equation $\sqrt{3}\cos\theta + \sin\theta = 2$ and write the general solution.

2008

Q. Show that: $tan^{-1}\left(\frac{1}{13}\right) + tan^{-1}\left(\frac{1}{4}\right) = tan^{-1}\left(\frac{1}{3}\right)$

Q. Solve $\cos\Theta + \cos2\Theta + 1 = 0$

2009

Q. Solve the trigonometric equation $\sqrt{1+\cos\theta} - \sqrt{1-\sin\theta} = 1$.

2010

Q. Without using a calculator and table, verify that $\tan^{-1}\frac{1}{13} + \tan^{-1}\frac{1}{4} = \tan^{-1}\frac{1}{3}$.

Q. Solve the equation for all values of 'θ':

$$2sin^2\theta - 3sin\theta - 2 = 0$$

2011

Q. Solve: $cos\theta + cos2\theta + 1 = 0$

2012

Q. Prove: $tan^{-1}\left(\frac{1}{3}\right) + \frac{1}{2}\, tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{8}$

2013

Q. Prove that: $Tan^{-1}\left(\frac{1}{13}\right) + Tan^{-1}\left(\frac{1}{4}\right) = Tan^{-1}\left(\frac{1}{3}\right)$

Q. Find the general solution of: $sin\theta + cos\theta = 1$

2014

Q. Prove that: $Tan^{-1}\left(\frac{1}{13}\right) + Tan^{-1}\left(\frac{1}{4}\right) = Tan^{-1}\left(\frac{1}{3}\right)$

Q. Find the general solution of $tan2\theta cot\theta = 3$

2015

Q. Solve the following trigonometric equation for all values of θ.

$$4 \sin^2 \theta \tan \theta + 4 \sin^2 \theta - 3 \tan \theta - 3 = 0$$

Q. Prove that: $Tan^{-1}\left(\frac{1}{13}\right) + Tan^{-1}\left(\frac{1}{4}\right) = Tan^{-1}\left(\frac{1}{3}\right)$