CONTENTS

MATHEMATICS-I

ECET

MATRICES & PARTIAL FRACTIONS

FOR SAIMEDHA STUDENTS ONLY

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MATRICES

- **Matrices :** A rectangular array (arrangement) of numbers real or complex is called a Matrix. The horizontal lines are called rows and the vertical lines are called columns. A set of mn numbers arranged in m rows and n columns is called m x n matrix.

  Row & Column Matrices : A matrix having only one row is called a row matrix, and matrix having only one column is called column matrix.
- **Zero Matrix :** A matrix having all its elements as zeros is called a zero matrix or null matrix, it is denoted by 'O'.
- **Square Matrix :** If in a matrix, the number of rows is equal to the number of columns, then it is called a square matrix.
- **Diagonal Matrix :** In a square matrix, the elements $a_{11}, a_{22}, \ldots\ldots a_{nn}$ are called the elements of the principal diagonal. If in a matrix all the elements above and below the principal diagonal are zero then it is called a diagonal matrix.
- **Scalar Matrix :** A diagonal matrix in which all the principal diagonal elements are equal is called as scalar matrix.

$[4], \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}, \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$ are scalar matrices of order 1,2 and 3 respectively.

- **Unit Matrix (Identity Matrix) :** A scalar matrix in which each diagonal element is unity is called the unit matrix (identity matrix)

$I_1 = [1], I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ are the unit matrices of order 1,2 and 3 respectively.

- **Equality of Matrices :** Two matrices A and B are equal if :
  - i. they are of the same type (order) i.e., both are mxn matrices.
  - ii. each element of A is equal to the corresponding element of B.
- **Addition of Matrices :** If $A = (a_{ij})_{m \times n}$ and $B = (b_{ij})_{m \times n}$ then $A + B = (a_{ij} + b_{ij})_{m \times n}$. Addition is defined between matrices of the same order.
- Addition of matrices is both commutative and associative, i.e., A + B = B + A (Commutative law) and (A+B) +C = A + (B+C) (associative law).
- If every element of the matrix A is multiplied by a scalar k then the matrix obtained is written as kA. If $A = (a_{ij})_{m \times n}$ then $kA = (ka_{ij})_{m \times n}$. If A and B are matrices of the same type then, k(A+B) = kA + kB.
- **Additive Inverse :** If A is a m x n matrix then the zero matrix of the type m x n is called the additive identity, then -A is called the additive inverse of A.
- **Product of Matrices :** If $A = [a_{ij}]_{m \times n}$ where $1 \le i \le m, 1 \le j \le n$ and $B = (b_{jk})_{n \times p}$ where $1 \le j \le n, 1 \le k \le p$ then the product A B is an m x p matrix and AB is given by $AB = C = (c_{ik})_{m \times p}$ where

$$C_{ik} = \sum_{j=1}^{n} a_{ij} b_{jk}$$

$c_{ik} = a_{i1}b_{1k} + a_{i2}b_{2k} + \ldots\ldots + a_{in}b_{nk}$

- Matrix multiplication does not follow commutative law.
- Matrix multiplication is associative i.e., (AB)C = A(BC).

➪ Matrix multiplication is distributive over matrix addition i.e., $A(B+C)=AB+AC$ & $(B+C)A=BA+CA$.

➪ The cancellation law need not hold in matrix multiplication, i.e., if A, B, C are three matrices then $AB=AC$ need not imply that $B=C$. For example let

$A=\begin{bmatrix}1 & 0\\ 2 & 0\end{bmatrix}$, $B=\begin{bmatrix}0 & 0\\ 1 & 1\end{bmatrix}$ and $C=\begin{bmatrix}0 & 0\\ 3 & 2\end{bmatrix}$. Then $AB=AC=O$. But $B \neq C$

➪ **Commute :** Two matrices A and B commute if $AB=BA$.

➪ **Transpose of the Matrix :** The matrix obtained by interchanging the rows and columns of a matrix A is called the transpose of the matrix A & if order of A is m x n then order of transpose of A is n x m, it is denoted by A^T.

➪ $(A^T)^T=A$
$(A+B)^T=A^T+B^T$
$(AB)^T=B^TA^T$
$(KA)^T=KA^T$ (K is a scalar)

➪ **Upper Triangular Matrix :** A square matrix $A=[a_{ij}]$ is called upper triangular matrix if $a_{ij}=0$ whenever $i>j$

Ex: $A=\begin{bmatrix}1 & 2 & 3\\ 0 & 5 & 7\\ 0 & 0 & 4\end{bmatrix}$

➪ **Lower Triangular Matrix :** A square matrix $A=(a_{ij})$ is lower triangular matrix if $a_{ij}=0$ whenever $i<j$. Ex. $\begin{bmatrix}1 & 0 & 0\\ 1 & 2 & 0\\ 1 & 3 & 5\end{bmatrix}$

➪ **Idempotent :** A square matrix is called idempotent if $A^2=A \Rightarrow |A|=0$ or 1

➪ **Involutary :** A square matrix is called involutary if $A^2=I \Rightarrow |A|=\pm 1$

➪ **Nilpotent :** A square matrix is called nilpotent matrix if there exists a positive integer 'n' such that $A^n=O$. If 'm' is the least positive integer such that $A^m=O$, them 'm' is called the index of the nilpotent matrix.

➪ Every nilpotent matrix is a singular matrix.

➪ **Conjugate of Matrix :** The conjugate of a matrix A is the matrix obtained by replacing the elements by their corresponding conjugate complex numbers. It is denoted by $\overline{A}$.

Ex: If $A=\begin{bmatrix}2+3i & i & 7i\\ 0 & -4i & 2-5i\\ 7 & -6-i & -i\end{bmatrix}$ then

$\overline{A}=\begin{bmatrix}2-3i & -i & -7i\\ 0 & 4i & 2+5i\\ 7 & -6+i & i\end{bmatrix}$

➪ If $\det A=\alpha+\beta i$ then $\det \overline{A}=\alpha-i\beta$

➪ **Symmetric Matrix :** A square matrix A is called a symmetric matrix if $A^T=A$.
i) $A+A^T$, AA^T, A^TA are Symmetric matrices
ii) If A is symmetric then A^n is also symmetric for all $n\in N$

➪ **Skew - Symmetric Matrix :** A square matrix A is called skew - symmetric if $A^T=-A$.
i) $A-A^T$ and A^T-A are skew - symmetric matrices
ii) If A is skew - symmetric then A^n is symmetric whenever n is an even +ve integer A^n is skew symmetric whenever n is an odd +ve integer.
iii) If A is a skew - symmetric matrix of odd order then $\det A=0$ and that of even order is a perfect square.

➪ If A is a square matrix then

$A=\frac{A^T+A}{2}+\frac{A-A^T}{2}$ where $\frac{A^T+A}{2}$ is symmetric matrix and $\frac{A-A^T}{2}$ is a skew - symmetric matrix.

➪ **Trace :** The sum of the principal (main diagonal elements $a_{11}+a_{22}+........+a_{nn}$ of a square matrix A is called the trace of A :
Trace $A=Tr(A)=a_{11}+a_{22}+........+a_{nn}$.
i) If A and B are two matrices of order n then
$Tr(A+B)=$ Trace A + Trace B.
$Tr(A-B)=$ Trace A - Trace B.
$Tr(kA)=k(TrA)$
$Tr(A^T)=Tr(A)$
ii) If A, B, C are square matrices of order n, then
$Tr\,ABC=Tr\,BCA=Tr\,CAB=Tr\,ACB=Tr\,BCA=Tr\,CBA$.
iii) Tr of skew -symmetric matrix is Zero.

➪ **Determinant of a Matrix :**

a) The determinant of a square matrix $A=\begin{bmatrix}a_{11} & a_{12}\\ a_{21} & a_{22}\end{bmatrix}$ is denoted by det A or $|A|$ and is defined as the expression

$\begin{vmatrix}a_{11} & a_{12}\\ a_{21} & a_{22}\end{vmatrix}=a_{11}a_{22}-a_{12}a_{21}$

det A is a real number or complex number,

b) $\begin{vmatrix}a_1 & b_1 & c_1\\ a_2 & b_2 & c_2\\ a_3 & b_3 & c_3\end{vmatrix}=a_1\begin{vmatrix}b_2 & c_2\\ b_3 & c_3\end{vmatrix}-b_1\begin{vmatrix}a_2 & c_2\\ a_3 & c_3\end{vmatrix}+c_1\begin{vmatrix}a_2 & b_2\\ a_3 & b_3\end{vmatrix}$

$=\sum a_1(b_2c_3-b_3c_2)$

➪ Let $A=\begin{bmatrix}a_{11} & a_{12} & a_{13}\\ a_{21} & a_{22} & a_{23}\\ a_{31} & a_{32} & a_{33}\end{bmatrix}$

Then the Minor of $a_{11}=M_{11}=\begin{vmatrix}a_{22} & a_{23}\\ a_{32} & a_{33}\end{vmatrix}$

Minor of $a_{12}=M_{12}=\begin{vmatrix}a_{21} & a_{23}\\ a_{31} & a_{33}\end{vmatrix}$

Minor of $a_{13}=M_{13}=\begin{vmatrix}a_{21} & a_{22}\\ a_{31} & a_{32}\end{vmatrix}$

Minor of $a_{21}=M_{21}=\begin{vmatrix}a_{12} & a_{13}\\ a_{32} & a_{33}\end{vmatrix}$

The cofactor of $a_{11}=A_{11}=(-1)^{1+1}M_{11}$
the cofactor of $a_{12}=A_{12}=(-1)^{1+2}M_{12}$
the cofactor of $a_{13}=A_{13}=(-1)^{1+3}M_{13}$
the cofactor of $a_{21}=A_{21}=(-1)^{2+1}M_{21}$
and so on.

➪ **Singular :** A matrix is said to be singular if $\det A=|A|=0$, it is non - singular if $|A|\neq 0$.
Unit matrix is non- singular.

➪ If A and B are non- singular matrices of the same type of then the product matrix AB is non-singular of the same type. If k is non-zero scalar then kA is non-singular $\Leftrightarrow$ A is non-singular.

➪ Let A be an n x n matrix. If the rows and the columns in a square matrix are interchanged, then the value of its determinant remains unaltered.
(1) $\det(A)=\det(A^T)$
(2) $\det(kA)=k^n|A|$.

➪ The determinant of a square matrix changes it sign when any two rows or columns are interchanged.

➪ If two rows or columns of a square matrix are identical or in the same ratio then the value of the determinant is zero.

➪ If all the elements of a row (or column) of a square matrix are multiplied by a number 'k' then the determinant of the resulting matrix is equal to 'k' times the determinant of the original matrix.

➪ If to the elements of row (or column) of a square matrix are added 'k' times the corresponding elements of any other row (or column) then the value of the determinant of the resulting matrix is not altered.

➪ (a) The sum of the products of the elements of any row (or columns) of a square matrix with the cofactors of the corresponding elements of same row (or columns) is det of the matrix.
(b) The sum of the products of the elements of any row (or columns) of a square matrix with the cofactors of the corresponding elements of any other row (or columns) is zero.

➪ If the elements of a square matrix are polynomials in x and if two rows or columns become identical when x = a, then (x - a) is a factor of its determinant, if three rows are identical then $(x-a)^2$ is a factor of determinant.

➪ **Adjoint of A :** Let A be a square matrix. The transpose of the matrix got from A by replacing the elements of A by the corresponding cofactors is called the adjoint of A. It is denoted by Adj. A.

➩ **Multiplicative Inverse :** If for a square matrix A, there exits another matrix B such that AB = BA = I, then 'B' is called the multiplicative inverse of A, It is denoted by A^{-1}

➩ $(A^{-1})^{-1} = A$, $(AB)^{-1} = B^{-1}A^{-1}$, $(A^T)^{-1} = (A^{-1})^T$ $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$ etc.

➩ If A is a $n \times n$ non- singular matrix, then

(i) $A(\text{Adj}A)=|A|I$

(ii) $A^{-1} = \dfrac{Adj\ A}{|A|}$

(iii) $\text{Adj}A = |A|A^{-1}$

(iv) $(\text{Adj } A)^{-1} = \dfrac{A}{|A|} = \text{Adj}(A^{-1})$

(v) $\text{Adj}A^T = (\text{Adj}A)^T$

(vi) $\text{Det}(A^{-1}) = (\text{Det } A)^{-1}$

(vii) $|\text{Adj}A| = |A|^{n-1}$

(viii) $\text{Adj}(\text{Adj } A) = |A|^{n-2}A$

(ix) For any scalar 'k' $\text{Adj}(kA) = k^{n-1}\text{Adj}A$

(x) $|\text{Adj Adj } A| = |A|^{(n-1)^2}$

(xi) $|\text{Adj Adj Adj } A| = |A|^{(n-1)^3}$

➩ If A and B are two non-singular matrices of the same type then

(i) $\text{Adj}(AB) = (\text{Adj}B)(\text{Adj}A)$.

(ii) $|\text{Adj}(AB)| = |\text{Adj}A|\ |\text{Adj}B| = |\text{Adj}B|\ |\text{Adj}A|$

➩ Let A and B be two matrices of order n. Then AB - BA is called the commutator of A and B. If A and B commute then the commutator of A and B is zero.

➩ The necessary and sufficient condition for the square matrix A to be invertible(to have inverse) is that $|A| \neq 0$

PRACTICE SET - I

01. If $A=\begin{bmatrix}-1 & -2 & 3\\ 1 & 2 & 4\\ 2 & -1 & 3\end{bmatrix}$, $B=\begin{bmatrix}1 & -2 & 5\\ 0 & -2 & 2\\ 1 & 2 & -3\end{bmatrix}$ and $\begin{bmatrix}-2 & 1 & 2\\ 1 & 1 & 2\\ 2 & 0 & 1\end{bmatrix}$ then A + B + C \

1) $\begin{bmatrix}2 & -3 & 10\\ -2 & 1 & 8\\ 5 & 1 & 1\end{bmatrix}$ 2) $\begin{bmatrix}-2 & 3 & 10\\ 2 & 1 & 8\\ 5 & 1 & 1\end{bmatrix}$

3) $\begin{bmatrix}2 & -3 & 10\\ 2 & 1 & 8\\ 5 & 1 & 1\end{bmatrix}$ 4) $\begin{bmatrix}-2 & -3 & 10\\ 2 & 1 & 8\\ 5 & 1 & 1\end{bmatrix}$

02. If $A=\begin{bmatrix}2 & 3 & 1\\ 0 & -1 & 5\end{bmatrix}$, $B=\begin{bmatrix}1 & 2 & -1\\ 0 & -1 & 3\end{bmatrix}$ then $2A-3B=$

1) $\begin{bmatrix}1 & 0 & 5\\ 0 & 1 & 1\end{bmatrix}$ 2) $\begin{bmatrix}8 & -1 & 6\\ -9 & -2 & 5\end{bmatrix}$

3) $\begin{bmatrix}-1 & 0 & 5\\ 0 & 1 & 1\end{bmatrix}$ 4) $\begin{bmatrix}-8 & -1 & 6\\ 9 & -2 & 5\end{bmatrix}$

03. If $A=\begin{bmatrix}1 & 2 & 3\\ 2 & 0 & -1\\ 0 & 2 & -2\end{bmatrix}$, $B=\begin{bmatrix}1 & 0 & 0\\ 0 & -1 & 0\\ -1 & 0 & 2\end{bmatrix}$ then $4A-3B=$

1) $\begin{bmatrix}1 & 8 & 12\\ 8 & 3 & -4\\ 3 & 8 & -14\end{bmatrix}$ 2) $\begin{bmatrix}-1 & 6 & 9\\ 6 & 4 & -3\\ 4 & 6 & -14\end{bmatrix}$

3) $\begin{bmatrix}1 & -6 & 9\\ 6 & 4 & 3\\ 4 & 6 & -14\end{bmatrix}$ 4) $\begin{bmatrix}-1 & 6 & 9\\ 6 & 4 & -3\\ 4 & 6 & 14\end{bmatrix}$

04. The additive inverse of $\begin{bmatrix}1 & 4 & -7\\ -3 & 2 & 5\\ 2 & 3 & -1\end{bmatrix}$ is

1) $\begin{bmatrix}1 & -4 & 7\\ 3 & -2 & -5\\ 2 & -3 & 1\end{bmatrix}$ 2) $\begin{bmatrix}-1 & -4 & 7\\ 3 & -2 & -5\\ -2 & -3 & 1\end{bmatrix}$

3) $\begin{bmatrix}-1 & -4 & 7\\ 3 & 2 & -5\\ -2 & -3 & 1\end{bmatrix}$ 4) $\begin{bmatrix}1 & -4 & 7\\ 3 & -2 & 5\\ -2 & -3 & 1\end{bmatrix}$

05. If $A=\begin{bmatrix}3 & 2 & -1\\ 1 & 5 & 4\\ -2 & 3 & 7\end{bmatrix}$, $B=\begin{bmatrix}1 & 2 & 1\\ 2 & 1 & 2\\ 1 & 2 & 1\end{bmatrix}$ and $3A+2X=5B$ then X =

1) $\begin{bmatrix}4/5 & 1\\ 9/5 & -2/5\\ -4/5 & -3/5\end{bmatrix}$ 2) $\begin{bmatrix}0 & 2\\ 3 & 7\\ 5 & 6\end{bmatrix}$

3) $\begin{bmatrix}-2 & 2 & 4\\ 7/2 & -5 & -1\\ 11/2 & 1/2 & -8\end{bmatrix}$ 4) $\begin{bmatrix}0 & -2\\ 3 & 7\\ 5 & 6\end{bmatrix}$

06. If $A - 2B = \begin{bmatrix}1 & -2\\ 3 & 0\end{bmatrix}$ and $2A - 3B = \begin{bmatrix}-3 & 3\\ 1 & -1\end{bmatrix}$, then B =

1) $\begin{bmatrix}-5 & 7\\ -5 & 1\end{bmatrix}$ 2) $\begin{bmatrix}5 & 7\\ -5 & 1\end{bmatrix}$

3) $\begin{bmatrix}-5 & 7\\ -5 & -1\end{bmatrix}$ 4) $\begin{bmatrix}-5 & -7\\ -5 & 1\end{bmatrix}$

07. If $\begin{bmatrix}x-3 & 2y-8\\ z+2 & 6\end{bmatrix} = \begin{bmatrix}5 & 2\\ -2 & a-4\end{bmatrix}$ then x,y,z, a are

1) 2, 2, 5, 5 2) -3, 2, 4, -1
3) 8, 5, -4, 10 4) 3, -2, 4, -3

08. If $A=\begin{bmatrix}0 & 2\\ 3 & -4\end{bmatrix}$, $kA=\begin{bmatrix}0 & 3a\\ 2b & 24\end{bmatrix}$, then the values of k, a, b are respectively

1) -6, -12, -18 2) -6, 4, 9
3) -6, -4, -9 4) -6, 12, 18

09. $\begin{bmatrix}x-1 & 2 & 5-y\\ 0 & z-1 & 7\\ 1 & 0 & a-5\end{bmatrix} = \begin{bmatrix}1 & 2 & 3\\ 0 & 4 & 7\\ 1 & 0 & 0\end{bmatrix}$ then find the values x,y,z,a are

1) 2, 2, 5, 5 2) -3, 2, 4, -1 3) 8, 5, -4, 10 4) 3, -2, 4, -3

10. The order of the matrix A is 3×5 and that of B is 2×3. The order of the matrix BA is

1) 2×3 2) 3×2 3) 2×5 4) 5×2

11. If $[-3, 4] + n[4, -3] = [10, -11] \Rightarrow 3m + 7n =$

1) 3 2) 5 3) 10 4) 1

12. If $A=\begin{bmatrix}4 & 2\\ -1 & 1\end{bmatrix}$ then $A^2 =$

1) $\begin{bmatrix}14 & 10\\ -5 & -1\end{bmatrix}$ 2) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$ 3) $\begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$ 4) $\begin{bmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{bmatrix}$

13. If $A=\begin{bmatrix}ab & b^2\\ -a^2 & -ab\end{bmatrix}$ then $A^2 =$

1) $\begin{bmatrix}14 & 10\\ -5 & -1\end{bmatrix}$ 2) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$

3) $\begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$ 4) $\begin{bmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{bmatrix}$

14. If $A=\begin{bmatrix}a^2 & ab & ac\\ ab & b^2 & bc\\ ac & bc & c^2\end{bmatrix}$ and $a^2+b^2+c^2=1$, then $A^2 =$

1) 2A 2) A 3) A^{-1} 4) none

15. If $A=\begin{bmatrix}2 & 3\\4 & -1\end{bmatrix}, B=\begin{bmatrix}1 & -2\\-1 & 3\end{bmatrix}$ then $A^2-B^2=$

1) $\begin{bmatrix}0 & 0\\0 & 0\end{bmatrix}$ 2) $\begin{bmatrix}13 & 11\\8 & 2\end{bmatrix}$

3) $\begin{bmatrix}-1 & 0\\0 & -1\end{bmatrix}$ 4) none

16. $A=\begin{bmatrix}-1 & 0\\0 & 2\end{bmatrix} \Rightarrow A^3-A^2=$

1) 4B 2) 8B 3) 64 B 4) 128B

17. $A=\begin{bmatrix}i & -i\\-i & i\end{bmatrix}, B=\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix} \Rightarrow A^8=$

1) 4B 2) 8B 3) 64 B 4) 128B

18. If $A=\begin{bmatrix}2 & 1\\1 & 3\end{bmatrix}, B=\begin{bmatrix}3 & 2 & 0\\1 & 0 & 4\end{bmatrix}$ then AB =

1) $\begin{bmatrix}6 & 2 & 5\\7 & 2 & 3\end{bmatrix}$ 2) $\begin{bmatrix}2 & 1 & 5\\0 & 1 & 7\end{bmatrix}$

3) $\begin{bmatrix}-5 & 2 & 5\\1 & 2 & 11\end{bmatrix}$ 4) $\begin{bmatrix}7 & 4 & 4\\6 & 2 & 12\end{bmatrix}$

19. If $A=\begin{bmatrix}1 & -1\\3 & 4\\-1 & 5\end{bmatrix}, B=\begin{bmatrix}-1 & 2\\3 & 1\end{bmatrix}$ then AB =

1) $\begin{bmatrix}-4 & 1\\9 & 10\\16 & 3\end{bmatrix}$ 2) $\begin{bmatrix}21 & 2\\4 & 18\\8 & 10\end{bmatrix}$

3) $\begin{bmatrix}-1 & 1\\2 & 2\\4 & 5\end{bmatrix}$ 4) $\begin{bmatrix}21 & 1\\2 & 15\\4 & 5\end{bmatrix}$

20. If $A=\begin{bmatrix}1 & 3 & 0\\-1 & 2 & 1\\0 & 0 & 2\end{bmatrix}, B=\begin{bmatrix}21 & 3 & 4\\1 & 2 & 3\\-1 & 1 & 2\end{bmatrix}$ then AB=

1) $\begin{bmatrix}5 & 3 & 11\\1 & 2 & 2\\1 & 3 & 5\end{bmatrix}$ 2) $\begin{bmatrix}5 & 9 & 13\\-1 & 2 & 4\\-2 & 2 & 4\end{bmatrix}$

3) $\begin{bmatrix}5 & 8 & 11\\1 & 2 & 3\\2 & 2 & -3\end{bmatrix}$ 4) none

21. If $A=\begin{bmatrix}1 & -2 & 3\\-4 & 2 & 5\end{bmatrix}, B=\begin{bmatrix}2 & 3\\4 & 5\\2 & 1\end{bmatrix}$ then

1) AB, BA exist and equal
2) AB, BA exist and not equal
3) AB exists and BA does not exist
4) AB does not exist and BA exists

22. If $A=\begin{bmatrix}1 & 4\\2 & 9\end{bmatrix}, B=\begin{bmatrix}9 & -4\\-2 & 1\end{bmatrix}$ then

1) AB = BA 2) AB $\neq$ BA
3) none 4) not determined

23. If $A=\begin{bmatrix}1 & 0 & 2\\0 & 1 & 2\\1 & 2 & 0\end{bmatrix}, B=\begin{bmatrix}1 & -2 & 3\\2 & 3 & -1\\-3 & 1 & 2\end{bmatrix}$ then

1) AB = BA 2) AB $\neq$ BA
3) none 4) not determined

24. If $A=\begin{bmatrix}0 & -1\\1 & 0\end{bmatrix}, B=\begin{bmatrix}0 & i\\i & 0\end{bmatrix}$ then

1) $A^2=B^2=I$ 2) $A^2=B^2=-I$
3) $A^2=I, B^2=-I$ 4) $A^2=-I, B^2=I$

25. If $A=\begin{bmatrix}i & 0\\0 & -i\end{bmatrix}, B=\begin{bmatrix}0 & -1\\1 & 0\end{bmatrix}, C=\begin{bmatrix}0 & i\\i & 0\end{bmatrix}$

1) $A^2=B^2=C^2=I$ 2) $A^2=B^2=C^2=O$
3) $A^2=B^2=C^2=I$ 4) none

26. If $A=\begin{bmatrix}i & 0\\0 & -i\end{bmatrix}, B=\begin{bmatrix}0 & -1\\1 & 0\end{bmatrix}, C=\begin{bmatrix}0 & i\\i & 0\end{bmatrix}$

1) $AB=-BA=-I$ 2) $AB=-BA=O$
3) $AB=-BA=I$ 4) none

27. If AB = A, BA = B then $A^2+B^2=$

1) A + B 2) A - B 3) AB 4) O

28. If $A=\begin{pmatrix}1 & -2\\4 & 5\end{pmatrix}$ and $f(t)=t^2-3t+7$, then $f(A)+\begin{pmatrix}3 & 6\\-12 & -9\end{pmatrix}=$

1) $\begin{pmatrix}1 & 0\\0 & 1\end{pmatrix}$ 2) $\begin{pmatrix}0 & 0\\0 & 0\end{pmatrix}$

3) $\begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}$ 4) $\begin{pmatrix}1 & 1\\0 & 0\end{pmatrix}$

29. If $A=\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$ then $A^4=$

1) $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$ 2) $\begin{bmatrix}1 & 1\\0 & 0\end{bmatrix}$ 3) $\begin{bmatrix}0 & 0\\1 & 1\end{bmatrix}$ 4) $\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$

30. If the matrix $A=\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix}$ then $A^{n+1}=$

1) $\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix}$ 2) $n\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix}$

3) $2^n\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix}$ 4) $2^{n+1}\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix}$

31. If $A=\begin{bmatrix}3 & -4\\1 & -1\end{bmatrix}$ then $A^n=$

1) $\begin{bmatrix}3n & -4n\\n & -n\end{bmatrix}$ 2) $\begin{bmatrix}2+n & 5-n\\n & -n\end{bmatrix}$

3) $\begin{bmatrix}3^n & (-4)^n\\1^n & (-1)^n\end{bmatrix}$ 4) $\begin{bmatrix}1+2n & -4n\\n & 1-2n\end{bmatrix}$

32. If $A^2=2A-I$ then for $n\neq 2$, $A^n=$

1) $nA-(n-1)I$ 2) $nA-I$
3) $2^{n-1}A-(n-1)I$ 4) $2^{n-1}A-I$

33. If $A=\begin{bmatrix}1 & 1\\1 & 1\end{bmatrix}$ and $n\in N$, then $A^n=$

1) 2^nA 2) $2^{n-1}A$ 3) nA 4) none

34. If n is positive integer and $A=\begin{bmatrix}a & 0 & 0\\0 & b & 0\\0 & 0 & c\end{bmatrix}$ then A^n is

1) $\begin{bmatrix}a^n & 0 & 0\\0 & b^n & 0\\0 & 0 & c^n\end{bmatrix}$ 2) $\begin{bmatrix}0 & 0 & 0\\0 & b^n & 0\\a^n & 0 & c^n\end{bmatrix}$

3) $\begin{bmatrix}a^n & 0 & c^n\\0 & b^n & 0\\0 & 0 & 0\end{bmatrix}$ 4) $\begin{bmatrix}0 & 0 & c^n\\0 & b^n & 0\\a^n & 0 & 0\end{bmatrix}$

35. If $A=\begin{bmatrix}\cos\theta & \sin\theta\\-\sin\theta & \cos\theta\end{bmatrix}$ then $A^n=$

1) $\begin{bmatrix}\cos n\theta & \sin n\theta\\-\sin n\theta & \cos n\theta\end{bmatrix}$

2) $\begin{bmatrix}\cos^n\theta & \sin^n\theta\\(-1)^n\sin^n\theta & \cos^n\theta\end{bmatrix}$

3) $\begin{bmatrix}n\cos\theta & n\sin\theta\\-n\sin\theta & n\cos\theta\end{bmatrix}$ 4) none

36. If $A=\begin{bmatrix}\cosh\theta & \sinh n\theta\\\sinh n\theta & \cosh n\theta\end{bmatrix}$ Then $A^n=$

1) $\begin{bmatrix}\cosh n\theta & \sinh n\theta\\\sinh n\theta & \cosh n\theta\end{bmatrix}$

2) $\begin{bmatrix}\cosh^n\theta & \sinh^n\theta\\\sinh^n\theta & \cosh^n\theta\end{bmatrix}$

3) $\begin{bmatrix}n\cosh\theta & n\sinh\theta\\n\sinh\theta & n\cosh\theta\end{bmatrix}$ 4) none

37. If $A(\alpha)=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$, then $A(\alpha)A(\beta)=$

1) $A(\alpha)-A(\beta)$ 2) $A(\alpha)+A(\beta)$
3) $A(\alpha-\beta)$ 4) $A(\alpha+\beta)$

38. If $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}, I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ then $A^2-(a+d)A=$

1) O 2) I 3) $(bc-ad)I$ 4) $(ad-bc)I$

39. If $A=\begin{bmatrix}0 & c & -b\\ -c & 0 & a\\ b & -a & 0\end{bmatrix}$ then $A^3=$

1) O 2) I
3) $(a^2+b^2+c^2)A$
4) $-(a^2+b^2+c^2)A$

40. If $A=\begin{bmatrix}1 & 1 & 3\\ 5 & 2 & 6\\ -2 & -1 & -3\end{bmatrix}$ then $A^3=$

1) O 2) 2A 3) I 4) A

41. If $A=\begin{bmatrix}1 & 1 & -2\\ 0 & 1 & 4\\ 2 & 3 & 1\end{bmatrix}$ then $A^3-3A^2-5A=$

1) -I 2) 2I 3) I 4) O

42. $A=\begin{bmatrix}1 & 2 & 2\\ 2 & 1 & 2\\ 2 & 2 & 1\end{bmatrix}\Rightarrow A^3-4A^2-6A=$

1) 0 2) A 3) -A 4) I

43. If $A=\begin{bmatrix}4 & 2\\ -1 & 1\end{bmatrix}$ then $(A-2I)(A-3I)=$

1) O 2) 3A 3) I 4) O

44. If $A=\begin{bmatrix}1 & 3\\ 3 & 4\end{bmatrix}$ and $A^2-kA-5I_2=O$, then k =

1) 3 2) 5 3) 7 4) -7

45. $[x\ y\ z]\begin{bmatrix}a & h & g\\ h & b & f\\ g & f & c\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=$

1) $[ax^2+by^2+cz^2+2hxy+2gxz+2fyz]$
2) $[ax^2+by^2+cz^2+hxy+gxz+fyz]$
3) $[2ax^2+2by^2+2cz^2+hxy+gxz+fyz]$
4) $[2ax^2+2by^2+2cz^2+2hxy+2gxz+2fyz]$

46. If $[x\ 4\ -1]\begin{bmatrix}2 & 1 & 0\\ 1 & 0 & 2\\ 0 & 2 & 4\end{bmatrix}\begin{bmatrix}x\\ 4\\ -1\end{bmatrix}=O$, then x =

1) $-1+\sqrt{6}$ 2) $8\pm\sqrt{5}$
3) $-2\pm\sqrt{10}$ 4) $3\pm\sqrt{6}$

47. If $A=\begin{bmatrix}x & 1\\ 1 & 0\end{bmatrix}$ and $A^2=I$ then x =

1) 0 2) 1 3) -1 4) 2

48. If A, B are two square matrices such that AB = A, BA = B then A , B are
1) idempotent matrices 2) diagonal matrices
3) scalar matrices 4) nilpotent matrices

49. If A,B are two idempotent matrices and AB = BA= O, then A + B is
1) scalar matrix 2) diagonal matrix
3) nilpotent matrix 4) idempotent matrix

50. The transpose of the matrix $\begin{bmatrix}2 & 4 & 2\\ 1 & 2 & 3\\ 3 & 1 & 5\end{bmatrix}$ is

1) $\begin{bmatrix}2 & 1 & 3\\ 4 & 2 & 1\\ 2 & 3 & 5\end{bmatrix}$ 2) $\begin{bmatrix}2 & 3 & 5\\ 4 & 2 & 1\\ 2 & 1 & 3\end{bmatrix}$

3) $\begin{bmatrix}2 & 1 & 3\\ -4 & -2 & -1\\ 2 & 3 & 5\end{bmatrix}$ 4) $\begin{bmatrix}3 & 1 & 5\\ 1 & 2 & 3\\ 2 & 4 & 2\end{bmatrix}$

1. If $A=\begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 5\\ x & 5 & 6\end{bmatrix}$ and $A^T=A$ then x =

1) 0 2) 1 3) 2 4) 3

2. If $A=\begin{bmatrix}x & 1 & 4\\ -1 & 0 & 7\\ -4 & -7 & 0\end{bmatrix}$ such that $A'=-A$, then x=

1) 0 2) 1 3) 4 4) -1

3. If $A=\begin{bmatrix}0 & 1 & -2\\ -1 & 0 & 3\\ 2 & -3 & 0\end{bmatrix}$ then $A+A^T=$

1) $\begin{bmatrix}4 & 0\\ 0 & -2\end{bmatrix}$ 2) $\begin{bmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{bmatrix}$

3) $\begin{bmatrix}3 & 1 & 5\\ 1 & 2 & 3\\ 2 & 4 & 2\end{bmatrix}$ 4) $\begin{bmatrix}2 & 3 & 5\\ 4 & 2 & 1\\ 2 & 1 & 3\end{bmatrix}$

4. If $A=\begin{bmatrix}1 & -1 & 2\\ 2 & 1 & -3\\ -2 & 1 & 2\end{bmatrix}$, $B=\begin{bmatrix}2 & 1 & 0\\ 2 & -3 & 1\\ 1 & 1 & -1\end{bmatrix}$ then $(A+B)^T=$

1) $\begin{bmatrix}0 & 3\\ 4 & 1\end{bmatrix}$ 2) $\begin{bmatrix}3 & 4 & -1\\ 0 & -2 & 2\\ 2 & -2 & 1\end{bmatrix}$

3) $\begin{bmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{bmatrix}$ 4) $\begin{bmatrix}2 & 3 & 5\\ 4 & 2 & 1\\ 2 & 1 & 3\end{bmatrix}$

55. If $A=[1\ 2\ 3]$, $B=\begin{bmatrix}2\\ 3\\ -1\end{bmatrix}$ then $(A+B^T)^T=$

1) $\begin{bmatrix}3\\ 5\\ 2\end{bmatrix}$ 2) $[3\ 3\ 1]$ 3) $[2\ 2\ 2]$ 4) $[0\ 0\ 0]$

56. If $A=\begin{bmatrix}1 & -2 & 3\\ -4 & 2 & 5\end{bmatrix}$, $B=\begin{bmatrix}1 & 3\\ -1 & 0\\ 2 & 4\end{bmatrix}$ then $2A+3B'=$

1) $\begin{bmatrix}5 & -7 & 12\\ 1 & 4 & 22\end{bmatrix}$ 2) $\begin{bmatrix}1 & 17\\ 1 & -4\\ 0 & 2\end{bmatrix}$

3) $\begin{bmatrix}19 & -25\\ -15 & 64\end{bmatrix}$ 4) $\begin{bmatrix}0 & 2\\ 1 & 0\end{bmatrix}$

57. If $A=\begin{bmatrix}1 & 5 & 3\\ 2 & 4 & 0\\ 3 & -1 & -5\end{bmatrix}$ and $B=\begin{bmatrix}2 & -1 & 0\\ 0 & -2 & 5\\ 1 & 2 & 0\end{bmatrix}$, then $3A-4B^T=$

1) $\begin{bmatrix}-5 & 15 & 5\\ 10 & 20 & -8\\ 9 & -23 & -15\end{bmatrix}$ 2) $\begin{bmatrix}5 & 19 & 9\\ 6 & 20 & -20\\ 5 & -11 & -15\end{bmatrix}$

3) $\begin{bmatrix}-5 & 19 & 9\\ 6 & 20 & -20\\ 5 & -11 & 15\end{bmatrix}$ 4) $\begin{bmatrix}5 & 19 & 9\\ 6 & -20 & -20\\ 5 & -11 & 15\end{bmatrix}$

58. If $A=\begin{bmatrix}i & 0\\ 0 & -i\end{bmatrix}$, then $AA'=$

1) $\begin{pmatrix}-1 & 0\\ 0 & 1\end{pmatrix}$ 2) $\begin{pmatrix}-1 & 0\\ 1 & 0\end{pmatrix}$

3) $\begin{pmatrix}-1 & 1\\ 0 & 0\end{pmatrix}$ 4) $\begin{pmatrix}-1 & 0\\ 0 & -1\end{pmatrix}$

59. If $A=\begin{bmatrix}0 & i\\ -i & 0\end{bmatrix}$ then $AA^T=$

1) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ 2) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$

3) $\begin{bmatrix}5 & 0 & -2\\ 0 & 6 & 0\\ -2 & 6 & 2\end{bmatrix}$ 4) $[0\ 0\ 0]$

60. If $A=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$, then $(2A)\left(\frac{1}{4}A'\right)=$

1) $\begin{bmatrix}1/2 & 1/2\\ 1/2 & 1/2\end{bmatrix}$ 2) $\begin{bmatrix}1/2 & 0\\ 0 & 1/2\end{bmatrix}$

3) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ 4) $\frac{1}{4}\begin{bmatrix}1 & 0\\ 0 & 0\end{bmatrix}$

61. If $A=\begin{bmatrix}2 & 0 & -1\\ 1 & 1 & 2\\ -1 & 1 & 0\end{bmatrix}$ then $AA^T=$

1) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ 2) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$

3) $\begin{bmatrix}5 & 0 & -2\\ 0 & 6 & 0\\ -2 & 0 & 2\end{bmatrix}$ 4) $[0\ 0\ 0]$

62. If $A=\begin{bmatrix}2 & 3\\ 5 & -7\end{bmatrix}$ then $(A')^2=$

1) $\begin{bmatrix}5 & -7 & 12\\ 1 & 4 & 22\end{bmatrix}$ 2) $\begin{bmatrix}1 & 17\\ 1 & -4\\ 0 & 2\end{bmatrix}$

3) $\begin{bmatrix}19 & -25\\ -15 & 64\end{bmatrix}$ 4) $\begin{bmatrix}0 & 2\\ 1 & 0\end{bmatrix}$

63. If $A=\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$ then

1) $AA^T=A^TA=I$ 2) $AA^T=A^TA=0$
3) $AA^T=A^TA=-I$ 4) none

64. If $3A=\begin{bmatrix}-1 & 2 & 2\\ 2 & -1 & 2\\ 2 & 2 & -1\end{bmatrix}$ then

1) $AA^T=A^TA=I$ 2) $AA^T=A^TA=0$
3) $AA^T=A^TA=-I$ 4) none

65. If $A=\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}2 & 0\\ 0 & 1\end{bmatrix}$ then $(AB)^T=$

1) $\begin{bmatrix}5 & -7 & 12\\ 1 & 4 & 22\end{bmatrix}$ 2) $\begin{bmatrix}1 & 17\\ 1 & -4\\ 0 & 2\end{bmatrix}$

3) $\begin{bmatrix}19 & -25\\ -15 & 64\end{bmatrix}$ 4) $\begin{bmatrix}0 & 2\\ 1 & 0\end{bmatrix}$

66. If A is a square matrix then AA' is
1) diagonal matrix 2) scalar matrix
3) symmetric matrix 4) idempotent matrix

67. Let A and B be two symmetric matrices of sam order. Then the matrix $AB-BA$ is :
1) a symmetric matrix
2) a skew-symmetric matrix
3) a null matrix
4) the identity matrix

68. Let A be a square matrix. Then $A+A^T$ will be
1) diagonal matrix 2) symmetric matrix
3) the identity matrix
4) skew-symmetric matrix

69. If $A=\begin{bmatrix}-1 & 2 & 3\\ 2 & 5 & 6\\ 3 & x & 7\end{bmatrix}$ is a symmetric matrix, then

=

1) 2 2) 3 3) 5 4) 6

70. If $A=\begin{bmatrix}0 & 4 & -2\\ -4 & 0 & 8\\ 2 & -8 & x\end{bmatrix}$ is a skew symmetric matrix, then x =
1) 0 2) 1 3) 2 4) 4

71. If $A=\begin{bmatrix}0 & 2 & 1\\ -2 & 0 & -2\\ -1 & x & 0\end{bmatrix}$ is a skew symmetric matrkx, then x =
1) 2 2) 3 3) 5 4) 6

72. If $A=\begin{bmatrix}1 & 3 & -5\\ 2 & -1 & 5\\ 1 & 0 & 1\end{bmatrix}$ then the trace of A is
1) 0 2) 1 3) 2 4) 4

73. If the trace of a matrix A is 3 then the trace of 5A is
1) 0 2) 3 3) 8 4) 15

74. If the trace of AB is 20 and the trace of B is 5 then trace of A - B is
1) 5 2) 15 3) 25 4) 35

75. If the trace of AB is 25 then the trace of BA is
1) 0 2) 1 3) 5 4) 25

76. If the traces of A,B are 20 and -8 then the trace of A + B is
1) 12 2) -12 3) 28 4) -28

77. If A is a skew-symmetric matrix, then trace of A is
1) 1 2) -1 3) 0 4) none

78. If $A=[a_{ij}]$ is a scalar matrix, then trace of A is

1) $\sum_i\sum_j a_{ij}$ 2) $\sum_i a_{ij}$

3) $\sum_j a_{ij}$ 4) $\sum_i a_{ij}$

79. The matrix $\begin{bmatrix}a & h & g\\ h & b & f\\ g & f & c\end{bmatrix}$ is
1) diagonal matrix 2) scalar matrix
3) nilpotent matrix 4) symmetric matrix

80. The matrix $\begin{bmatrix}1 & -3 & -4\\ -1 & 3 & 4\\ 1 & -3 & -4\end{bmatrix}$ is
1) diagonal matrix 2) scalar matrix
3) nilpotent matrix 4) idempotent matrix

81. $A=\begin{bmatrix}1 & 1 & 3\\ 5 & 2 & 6\\ -2 & -1 & -3\end{bmatrix}$ then Ais
1) idempotent matrix 2) involuntary matrix
3) nilpotent matrix 4) scalar matrix

82. If $A=\begin{bmatrix}ab & b^2\\ -a^2 & -ab\end{bmatrix}$, then A is
1) idempotent matrix
2) involutary matrix
3) nilpotent matrix of index 2
4) nilpotent matrix of index 3

83. If $A=\begin{bmatrix}2 & -2 & -4\\ -1 & 3 & 4\\ 1 & -2 & -3\end{bmatrix}$, then A is
1) idempotent matrix
2) involuntary matrix
3) nilpotent matrix of index 2
4) nilpotent matrix of index 3

PUT YOUR FULL EFFORTS
DONT WORRY ABOUT RESULTS
THEY ARE BOUND TO COME TO YOU

PRACTICE SET - I KEY

01-1	02-1	03-1	04-2	05-3
06-3	07-3	08-1	09-3	10-4
11-4	12-1	13-3	14-2	15-2
16-1	17-4	18-4	19-1	20-2
21-2	22-1	23-2	24-2	25-1
26-4	27-1	28-2	29-1	30-3
31-4	32-1	33-2	34-1	35-1
36-1	37-4	38-3	39-4	40-1
41-3	42-3	43-1	44-2	45-1
46-3	47-1	48-1	49-4	50-1
51-4	52-1	53-2	54-2	55-1
56-1	57-1	58-4	59-2	60-1
61-3	62-3	63-1	64-1	65-4
66-3	67-2	68-2	69-4	70-1
71-1	72-2	73-4	74-2	75-4
76-1	77-3	78-4	79-3	80-3
81-3	82-3	83-1		

PRACTICE SET - II

01. If $A=\begin{bmatrix}1 & 3\\ 2 & 1\end{bmatrix}$ then the determinant of A^2-2A is

1) 5 2) 25 3) -5 4) -25

02. The cofactors of 7 and 6 in the matrix $\begin{bmatrix}1 & 2 & 3\\ 4 & -1 & 7\\ 2 & 4 & 6\end{bmatrix}$ are

1) -22, 0 2) 0, 9 3) 0, -9 4) -1, -1

03. $\begin{vmatrix}a & p & q\\ 0 & b & r\\ 0 & 0 & c\end{vmatrix}=$

1) 0 2) abc 3) pqr 4) 1

04. $\begin{vmatrix}a & h & g\\ h & b & f\\ g & f & c\end{vmatrix}=$

1) 0 2) 1

3) $abc+2fgh-af^2=bg^2-ch^2$

4) $af^2+bg^2+ch^2-abc-2fgh$

05. If a,b,c are positive and not all equal, then

$\begin{vmatrix}a & b & c\\ b & c & a\\ c & a & b\end{vmatrix}$

1) ≤ 0 2) <0 3) >0 4) ≥ 0

06. $\begin{vmatrix}24 & 25 & 26\\ 25 & 26 & 27\\ 26 & 27 & 27\end{vmatrix}=$

1) 0 2) -1 3) 1 4) 2

07. $\begin{vmatrix}1990 & 1991 & 1992\\ 1991 & 1992 & 1993\\ 1992 & 1993 & 1994\end{vmatrix}=$

1) 1992 2) 1993 3) 1994 4) 0

08. If $1, \omega, \omega^2$ are the cube roots of unity, then

$\Delta=\begin{vmatrix}1 & \omega^n & \omega^{2n}\\ \omega^n & \omega^{2n} & 1\\ \omega^{2n} & 1 & \omega^n\end{vmatrix}=$

1) 1 2) ω 3) ω^2 4) 0

09. $\begin{vmatrix}0 & p-q & p-r\\ q-p & 0 & q-r\\ r-p & r-q & 0\end{vmatrix}=$

1) 0 2) $(p-q)(q-r)(r-p)$

3) pqr 4) $p+q+r$

10. $\begin{vmatrix}-a^2 & ab & ac\\ ab & -b^2 & bc\\ ac & bc & -c^2\end{vmatrix}=$

1) $a^2b^2c^2$ 2) $2a^2b^2c^2$ 3) $3a^2b^2c^2$ 4) $4a^2b^2c^2$

11. If $\begin{vmatrix}a+b & b+c & c+a\\ b+c & c+a & a+b\\ c+a & a+b & b+c\end{vmatrix}=k\begin{vmatrix}a & b & c\\ b & c & a\\ c & a & b\end{vmatrix}$ then $k=$

1) 1 2) 2 3) 4 4) 8

12. If $\begin{vmatrix}x & y & z\\ -x & y & z\\ x & -y & z\end{vmatrix}=k\ xyz$, then $k=$

1) 1 2) 3 3) 4 4) 2

13. $\begin{vmatrix}x & a & a\\ a & x & a\\ a & a & x\end{vmatrix}=$

1) $(x+2a)(x-a)$ 2) $(x+2a)^2(x-a)$

3) $(x+2a)(x-a)^2$ 4) $(x+2a)^2(x-a)^2$

14. $\begin{vmatrix}a-b-c & 2b & 2c\\ 2a & b-c-a & 2c\\ 2a & 2b & c-a-b\end{vmatrix}=$

1) $(a+b+c)^2$ 2) $(a+b+c)^4$

3) $(a+b+c)^3$ 4) $(a+b+c)$

15. $\begin{vmatrix}a+b+2c & a & b\\ c & b+c+2a & b\\ c & a & c+a+2b\end{vmatrix}=$

1) $(a+b+c)^3$ 2) $2(a+b+c)^3$

3) $3(a+b+c)^3$ 4) $(a+b+c)^2$

16. $\begin{vmatrix}a^2+2a & 2a+1 & 1\\ 2a+1 & a+2 & 1\\ 3 & 3 & 1\end{vmatrix}=$

1) $(a-1)^2$ 2) $(a-1)^3$

3) $(a-1)^4$ 4) $2(a-1)$

17. $\begin{vmatrix}\sin^2 x & \cos^2 x & 1\\ \cos^2 x & \sin^2 x & 1\\ -10 & 12 & 2\end{vmatrix}=$

1) 0 2) $12\cos^2 x-10\sin^2 x-2$

3) $12\sin^2 x-10\cos^2 x-2$ 4) $10\sin 2x$

18. If $A=[a_{ij}]$ is a scalar matrix of order $n\times n$ such that $a_{ii}=k$ for all i, then $|A|=$

1) nk 2) $n+k$ 3) n^k 4) k^n

19. If $A=[a_{ij}]$ is a square matrix of order $n\times n$ and k is a scalar, then $|kA|=$

1) $k^n|A|$ 2) $k|A|$ 3) $k^{n-1}|A|$ 4) none

20. $\begin{vmatrix}y+z & x & x\\ y & z+x & y\\ z & z & x+y\end{vmatrix}=$

1) xyz 2) 2xyz 3) 3xyz 4) 4xyz

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

1) $(a-b)(b-c)(c-a)$

2) $(a-b)(b-c)(c-a)(a+b+c)$

3) $(a-b)(b-c)(c-a)abc$

4) $(a-b)(b-c)(c-a)(ab+bc+ca)$

22. $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix}=0 \quad x\neq y\neq z \Rightarrow 1+xyz=$

1) 0 2) -1 3) 1 4) 2

23. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix}=0$ and vectors $(1,a,a^2),(1,b,b^2)$ and $(1,c,c^2)$ are non-coplanar then the product abc =

1) -1 2) 1 3) 0 4) 2

24. If $abc\neq 0$ and if $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}=0$, then $\dfrac{a^3+b^3+c^3}{abc}=$

1) 2 2) 3 3) 1 4) -3

25. Let $A=\begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$. If $|A^2|=25$, then $|\alpha|$ equals

1) 5^2 2) 1 3) 1/5 4) 5

26. If the matrix $A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \lambda \end{bmatrix}$ is singular one, then λ is

1) 3 2) 4 3) 2 4) 5

27. If $\begin{vmatrix} 3x-8 & 3 & 3 \\ 3 & 3x-8 & 3 \\ 3 & 3 & 3x-8 \end{vmatrix}=0$, then x =

1) 2/3, 11/3 2) 3/2, 11/3
3) 2/3, 3/11 4) 3/2, 3/11

28. If one of the roots of $\begin{vmatrix} 3 & 5 & x \\ 7 & x & 7 \\ x & 5 & 3 \end{vmatrix}=0$ is -10, the other roots are :

1) 3, 7 2) 4, 7 3) 3, 9 4) 3, 4

29. If $\begin{vmatrix} 1+x & 1-x & 1-x \\ 1-x & 1+x & 1-x \\ 1-x & 1-x & 1+x \end{vmatrix}=0$ then x =

1) 0 or 3 2) 1 or 2
3) 2 4) -1

30. If $\begin{vmatrix} x & x+y & x+y+z \\ 2x & 3x+2y & 4x+3y+2z \\ 3x & 6x+3y & 10x+6y+3z \end{vmatrix}=64$ then x =

1) 0 2) 1 3) 4 4) -1

31. If α,β,γ are the roots of $x^3+px+q=0$, then $\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix}=$

1) 0 2) p 3) q 4) p^2-2q

32. If $a\neq p, b\neq q, c\neq r$ and $\begin{vmatrix} p & b & c \\ a & q & c \\ a & b & r \end{vmatrix}=0$ then the value of $\dfrac{p}{p-a}+\dfrac{q}{q-b}+\dfrac{r}{r-c}$

1) 0 2) 1 3) 2 4) 3

33. If a,b,c are in A.P, then $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix}=$

1) 0 2) 1 3) -1 4) 2

34. If $\begin{vmatrix} \lambda^3+3\lambda & \lambda-1 & \lambda+3 \\ \lambda+1 & 2-\lambda & \lambda-3 \\ \lambda-3 & \lambda+4 & 3\lambda \end{vmatrix}=p\lambda^4+q\lambda^3+r\lambda^2+t$, then t =

1) 22 2) 21 3) 32 4) 33

PRACTICE SET -II KEY

01–2	02–3	03–2	04–3	05–2
06–3	07–4	08–2	09–4	10–4
11–2	12–2	13–1	14–3	15–2
16–2	17–1	18–4	19–1	20–4
21–2	22–1	23–1	24–2	25–3
26–1	27–1	28–1	29–1	30–3
31–1	32–3	33–1	34–2	

PRACTICE SET - III

01. If $A=\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ then Adj A =

1) $\begin{bmatrix} -1 & -3 \\ -2 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & -3 \\ -2 & 1 \end{bmatrix}$
3) $\begin{bmatrix} 1 & -3 \\ 2 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} -1 & -3 \\ -2 & -1 \end{bmatrix}$

02. $A=\begin{bmatrix} 2 & 3 \\ 2 & -1 \end{bmatrix}\Rightarrow 8A^{-1}=$

1) $\begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 3 \\ -2 & 2 \end{bmatrix}$
3) $\begin{bmatrix} -1 & 3 \\ 2 & 2 \end{bmatrix}$ 4) $\begin{bmatrix} 1 & 3 \\ 2 & -2 \end{bmatrix}$

03. If $\begin{bmatrix} x & y^3 \\ 2 & 0 \end{bmatrix}=\begin{bmatrix} 1 & 8 \\ 2 & 0 \end{bmatrix}$, then $\begin{bmatrix} x & y \\ 2 & 0 \end{bmatrix}^{-1}=$

1) $\begin{bmatrix} 0 & -2 \\ -2 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
3) $\begin{bmatrix} 0 & -8 \\ -2 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} 0 & 1/2 \\ 1/2 & -1/4 \end{bmatrix}$

04. If the matrix A is such that $A\begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}=\begin{bmatrix} -4 & 1 \\ 7 & 7 \end{bmatrix}$ then A =

1) $\begin{bmatrix} 1 & 1 \\ 2 & -3 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 1 \\ -2 & 3 \end{bmatrix}$
3) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ 4) $\begin{bmatrix} -1 & 1 \\ 2 & 3 \end{bmatrix}$

05. The matrix A satisfying the equation $\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}A=\begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ is

1) $\begin{bmatrix} 1 & 4 \\ -1 & 0 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & -4 \\ 1 & 0 \end{bmatrix}$
3) $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$ 4) none

06. If $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}A\begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then the matrix A =

1) $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ 3) $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

07. If A is a matrix such that $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}A(1\,1)=\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$ then A =

1) $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ 2) $(2\ 1)$
3) $\begin{pmatrix} 1 & 0 \\ -1 & 1 \end{pmatrix}$ 4) $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$

08. If $A=\begin{bmatrix}2 & 2\\ -3 & 2\end{bmatrix}$, $B=\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$, then $(B^{-1}A^{-1})^{-1}=$

1) $\begin{bmatrix}2 & -2\\ 2 & 3\end{bmatrix}$ 2) $\begin{bmatrix}3 & -2\\ 2 & 2\end{bmatrix}$

3) $\frac{1}{10}\begin{bmatrix}2 & 2\\ -2 & 3\end{bmatrix}$ 4) $\frac{1}{10}\begin{bmatrix}3 & 2\\ -2 & 2\end{bmatrix}$

09. If $A=\begin{bmatrix}-1 & -2 & -2\\ 2 & 1 & -2\\ 2 & -2 & 1\end{bmatrix}$ then adj A =

1) A 2) A^T 3) $2A^T$ 4) $3A^T$

10. If $A=\begin{bmatrix}-1 & -2 & -2\\ 2 & 1 & -2\\ 2 & -2 & 1\end{bmatrix}$, Adj A $= xA^T$, then x =

1) 0 2) 1 3) 2 4) 3

11. $\text{Adj}\begin{bmatrix}1 & 0 & 2\\ -1 & 1 & -2\\ 0 & 2 & 1\end{bmatrix}=\begin{bmatrix}5 & a & -2\\ 1 & 1 & 0\\ -2 & -2 & b\end{bmatrix}\Rightarrow[a\ \ b]=$

1) $[-4\ \ 1]$ 2) $[-4\ \ -1]$

3) $[4\ \ 1]$ 4) $[4\ \ -1]$

12. The inverse of $\begin{bmatrix}3 & 5 & 7\\ 2 & -3 & 1\\ 1 & 1 & 2\end{bmatrix}$ is

1) $\begin{bmatrix}7 & 3 & -5\\ 3 & 1 & -2\\ -26 & -11 & 19\end{bmatrix}$ 2) $\begin{bmatrix}7 & 3 & -26\\ 3 & 1 & -11\\ -5 & -2 & 19\end{bmatrix}$

3) $\begin{bmatrix}3 & 2 & 1\\ 5 & -3 & 1\\ 7 & 1 & 2\end{bmatrix}$ 4) none

13. The inverse of $\begin{bmatrix}1 & 3 & 3\\ 1 & 4 & 3\\ 1 & 3 & 4\end{bmatrix}$ is

1) $\begin{bmatrix}7 & -3 & -3\\ -1 & 1 & 0\\ -1 & 0 & 1\end{bmatrix}$ 2) $\begin{bmatrix}7 & 3 & -3\\ 1 & 1 & 0\\ -1 & 0 & -1\end{bmatrix}$

3) $\begin{bmatrix}-7 & 3 & -3\\ -1 & -1 & 0\\ -1 & 0 & 1\end{bmatrix}$ 4) $\begin{bmatrix}7 & -3 & -3\\ 1 & 1 & 0\\ 1 & 0 & 1\end{bmatrix}$

14. $A=\begin{pmatrix}1 & 0 & 1\\ 0 & 1 & 1\\ 0 & 1 & 0\end{pmatrix}\Rightarrow A^2-2A=$

1) A^{-1} 2) $-A^{-1}$ 3) I 4) $-I$

15. If $F(x)=\begin{bmatrix}\cos x & -\sin x & 0\\ \sin x & \cos x & 0\\ 0 & 0 & 1\end{bmatrix}$ and

$G(x)=\begin{bmatrix}\cos x & 0 & \sin x\\ 0 & 1 & 0\\ -\sin x & 0 & \cos x\end{bmatrix}$ then

$[F(x)G(x)]^{-1}=$

1) $F(-x)G(-x)$ 2) $F(x^{-1})G(x^{-1})$

3) $G(-x)F(-x)$ 4) $G(x^{-1})F(x^{-1})$

16. Let P and Q be two 2×2 matrices. Consider the statements

i) $PQ=O\Rightarrow P=O$ or $Q=O$ both

ii) $PQ=I_2\Rightarrow P=Q^{-1}$

iii) $(P+Q)^2=P^2+2PQ+Q^2$. Then

1) i and ii are false while iii is true
2) i and iii are false while ii is true
3) ii and iii are false while i is true
4) none

17. If $A=\begin{bmatrix}0 & 1 & 2\\ 1 & 2 & 3\\ 3 & x & 1\end{bmatrix}$ and $A^{-1}=\begin{bmatrix}1/2 & -1/2 & 1/2\\ -4 & 3 & y\\ 5/2 & -3/2 & 1/2\end{bmatrix}$, then

1) $x=1, y=-1$ 2) $x=-1, y=1$

3) $x=2, y=-1/2$ 4) $x=1/2, y=1/2$

18. Let $A=\begin{pmatrix}1 & -1 & 1\\ 2 & 1 & -3\\ 1 & 1 & 1\end{pmatrix}$ and $10B=\begin{pmatrix}4 & 2 & 2\\ -5 & 0 & \alpha\\ 1 & -2 & 3\end{pmatrix}$. If B is the inverse of matrix A, then α is

1) -2 2) 5 3) 2 4) -1

19. If $A=\begin{bmatrix}0 & 1 & -1\\ 2 & 1 & 3\\ 3 & 2 & 1\end{bmatrix}$, then $\left[A\,\text{adj}(A)\,A^{-1}\right]A=$

1) $\begin{bmatrix}3 & 0 & 0\\ 0 & 3 & 0\\ 0 & 0 & 3\end{bmatrix}$ 2) $\begin{bmatrix}-6 & 0 & 0\\ 0 & -6 & 0\\ 0 & 0 & -6\end{bmatrix}$

3) $\begin{bmatrix}0 & 1/6 & -1/6\\ 1/3 & 1/6 & 1/2\\ 1/2 & 1/3 & 1/6\end{bmatrix}$ 4) none

20. If $A\neq A^2=I$, then $\det(I+A)=$

1) 0 2) 1 3) -1 4) none

21. If A is a nonzero square matrix of order n with $\det(I+A)\neq0$

1) $A-A+A^2$ 2) $I+A+A^2$
3) null matrix 4) unit matrix

22. If A is a 4×4 matrix and det A = -2 then det (Adj A) =

1) 100 2) 25 3) -8 4) 8

23. If A is 4×4 matrix and det (Adj A) = -27 then det A =

1) ±2 2) 3 3) -3 4) 8

24. If A is a square matrix such that $A(\text{Adj}A)=\begin{pmatrix}4 & 0 & 0\\ 0 & 4 & 0\\ 0 & 0 & 4\end{pmatrix}$ then det (Adj A) =

1) 4 2) 16 3) 64 4) 256

25. If A is a square matrix, then adj $A^T-(\text{adj }A)^T=$

1) $2|A|$ 2) $2|A|I$
3) null matrix 4) unit matrix

26. Which one of the following statements is false :

1) if $|A|=0$, then $|\text{Adj }A|=0$
2) adjoint of a diagonal matrix of order 3×3 is a diagonal matrix
3) product of two upper triangular matrices is an upper triangular matrix
4) adj (AB) = adj (A) adj (B)

27. If A and B are two sqaure matrices such that $B=-A^{-1}BA$ then $(A+B)^2=$

1) O 2) A^2+B^2 3) $A^2+2AB+B^2$ 4) $A+B$

28. A square nonsingular matrix satisfies $A^2-A+2I=0$, then $A^{-1}=$

1) I - A 2) (I - A)/2 3) I + A 4) (I + A)/2

29. A is a square matrix satisfying the equation $A^2-4A-5I=O$. Then $A^{-1}=$

1) $A-4I$ 2) $\frac{1}{3}(A-4I)$

3) $\frac{1}{4}(A-4I)$ 4) $\frac{1}{5}(A-4I)$

30. If $A=\begin{bmatrix}a & b\\ 0 & c\end{bmatrix}$ then $A^{-1}+(A-aI)(a-cI)=$

1) $\frac{1}{bc}\begin{bmatrix}c & b\\ 0 & -a\end{bmatrix}$ 2) $\frac{1}{ac}\begin{bmatrix}c & -b\\ 0 & a\end{bmatrix}$

3) $\frac{1}{ac}\begin{bmatrix}a & -b\\ 0 & c\end{bmatrix}$ 4) $\frac{1}{ab}\begin{bmatrix}c & -b\\ 0 & -c\end{bmatrix}$

31. The inverse of a symmetric matrix (if it exists) is
1) a symmetric matrix
2) a skew symmetric matrix
3) a diagonal matrix 4) none of these

32. The inverse of a skew symmetric matrix (if it exists) is
1) a symmetric matrix 2) a skew symmetric matrix
3) a diagonal matrix 4) none of these

33. The inverse of a skew symmetric matrix of odd order is
1) a symmetric matrix 2) a skew symmetric matrix
3) diagonal matrix 4) does not exist

34. If A is an orthogonal matrix, then $|A|$ is
1) 1 2) -1 3) ± 1 4) 0

35. The rank of $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

36. The rank of $\begin{bmatrix} 1 & 0 & -4 \\ 2 & -1 & 3 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

37. The rank of $\begin{bmatrix} -1 & 2 \\ -2 & 4 \\ 3 & 6 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

38. The rank of $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

39. The rank of $\begin{bmatrix} 1 & 4 & -1 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

40. The rank of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

41. The rank of $\begin{bmatrix} 1 & 2 & 3 & 1 \\ 2 & 4 & 6 & 2 \\ 1 & 2 & 3 & 2 \end{bmatrix}$ is
1) 0 2) 1 3) 2 4) 3

42. The solution of $x+y+z=7, x+2y+3z=16$, $x+3y+4z=22$ is
1) $x=1, y=-3, z=2$ 2) $x=1, y=2, z=3$
3) $x=1, y=3, z=3$
4) $x=-1, y=4, z=4$

43. The equations $2x+y-4z=0,\ x-2y+3z=0,\ x-y+z=0$ have
1) unique solution 2) no solution
3) infinitely many solutions
4) none

44. The number of nontrivial solutions of the system $x-y+z=0, x+2y-z=0,\ 2x+y+3z=0$ is
1) 0 2) 1 3) 2 4) 3

45. For the equations $x+2y+3z=1, 2x+y+3z=2, 5x+5y+9z=4$
1) There is only one solution
2) There exists infinitely many solutions
3) There is no solution 4) none

46. The equation $x+2y-z=3, 3x-y+2z=1$, $2x-2y+3z=2, x-y+z=1$ have
1) no solution 2) unique solution
3) infinitely many solutions 4) none

47. The equations $x-y+2z=4$, $3x+y+4z=6, x+y+z=1$ have
1) no solution 2) unique solution
3) infinitely many solutions 4) none

48. If the system of equations $3x-2y+z=0, \lambda x-14y+15z=0$, $x+2y+3z=0$ has nontrivial solution, then $\lambda=$
1) 12 2) 19 3) 24 4) 29

49. If the system of equations $x+y+z=6$, $x+2y+\lambda z=0$, $x+2y+3z=10$ has no solution then $\lambda=$
1) 2 2) 3 3) 4 4) 5

50. If the system of equations $x+2y+3z=\lambda x$, $3x+y+2z=\lambda y, 2x+3y+z=\lambda z$ has nontrivial solution, then $\lambda=$......
1) 6 2) 12 3) 18 4) 16

51. The number of values of k for which the linear equations $4x+ky+2z=0$, $kx+4y+z=0, 2x+2y+z=0$ possess a non-zero solution is :
1) 1 2) zero 3) 3 4) 2

52. The equations $x+y+z=6, x+2y+3z=10$, $x+2y+\lambda z=\mu$ have unique solution if
1) $\lambda=3, \mu=10$ 2) $\lambda=3, \mu\neq 10$
3) $\lambda\neq 3$ 4) none

53. If the system of equation $x+2y+3z=\lambda x$, $3x+y+2z=\lambda y,\ 2x+3y+z=\lambda z$ has nontrivial solution, then $\lambda=$.....
1) 6 2) 12 3) 18 4) 16

54. If the system of equations $ax+y+z=0, x+by+z=0, x+y+cz=0$, $(a, b, c\neq 1)$ has a non trivial solution (non-zero solution), then $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}=$
1) 1 2) -1 3) 0 4) none

55. If the system of linear equations $x+2ay+az=0$, $x+3by+bz=0,\ x+4cy+cz=0$ has a non-zero solution, then a, b, c
1) are in G.P. 2) are in H.P.
3) satisfy $a+2b+3c=0$
4) are in A.P.

PRACTICE SET - III KEY

01–1	02–4	03–4	04–3	05–3
06–1	07–4	08–1	09–4	10–4
11–3	12–2	13–1	14–2	15–3
16–2	17–1	18–2	19–1	20–1
21–1	22–3	23–3	24–2	25–3
26–4	27–2	28–2	29–4	30–2
31–1	32–2	33–4	34–3	35–2
36–3	37–3	38–4	39–4	40–2
41–3	42–3	43–3	44–1	45–1
46–1	47–3	48–4	49–2	50–1
51–4	52–3	53–1	54–1	55–2

SELF TEST

01. $m\begin{bmatrix} -3 & 4 \end{bmatrix}+n\begin{bmatrix} 4 & -3 \end{bmatrix}=\begin{bmatrix} 10 & -11 \end{bmatrix} \Rightarrow 3m+7n=$
1) 3 2) 5 3) 10 4) 1

02. $Adj\begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix}=\begin{bmatrix} 5 & a & -2 \\ 1 & 1 & 0 \\ -2 & -2 & b \end{bmatrix} \Rightarrow \begin{bmatrix} a & b \end{bmatrix}$
$=$ 1) $\begin{bmatrix} -4 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} -4 & -1 \end{bmatrix}$
3) $\begin{bmatrix} 4 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} 4 & -1 \end{bmatrix}$

03. $A=\begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \Rightarrow A^3-A^2=$
1) 2A 2) 2I 3) A 4) I

04. Match the following elements of $\begin{bmatrix}1 & -1 & 0\\ 0 & 4 & 2\\ 3 & -4 & 6\end{bmatrix}$ with their cofactors and choose the correct answer

Element	Cofactor
I. -1	a) -2
II. 1	b) 32
III. 3	c) 4
IV. 6	d) 6
	e) -6

1) b, d, a, c 2) b, d, c, a
3) d, b, a, c 4) d, a, b, c

05. det $\begin{bmatrix}1990 & 1991 & 1992\\ 1991 & 1992 & 1993\\ 1992 & 1993 & 1994\end{bmatrix}$ =

1) 1992 2) 1993 3) 1994 4) 0

06. The rank of $\begin{bmatrix}1 & -1 & 1\\ 1 & 1 & -1\\ -1 & 1 & 1\end{bmatrix}$ is :

1) 0 2) 1 3) 2 4) 3

07. If p+q+r=0 and $\begin{vmatrix}pa & qb & rc\\ qc & ra & pb\\ rb & pc & qa\end{vmatrix} = k\begin{vmatrix}a & b & c\\ c & a & b\\ b & c & a\end{vmatrix}$ then k =

1) 0 2) abc 3) pqr 4) a+b+c

08. If $\begin{vmatrix}Cos(A+B) & -Sin(A+B) & Cos2B\\ SinA & CosA & SinB\\ -CosA & SinA & CosB\end{vmatrix}$ = 0 then B=

1) $(2n+1)\frac{\pi}{2}$ 2) $n\pi$ 3) $(2n+1)\pi$ 4) $2n\pi$

09. The number of solutions of the system equations 2x + y - z = 7, x - 3y + 3z = 1, x + 4y - 3z = 5 is..

1) 3 2) 2 3) 1 4) 0

10. If A, B are square matrices of order 3, A is non-singular and AB = 0, then B is a

1) Null Matrix 2) Non-singular Matrix
3) Singular Matrix 4) Unit Matrix

11. If A = $\begin{bmatrix}1 & 0 & 1\\ 2 & 1 & 0\\ 3 & 2 & 1\end{bmatrix}$ then, det A =

1) 2 2) 3 3) 4 4) 5

12. If $x^2+y^2+z^2 \neq 0$, x = cy + bz, y = az + cx, and z = bx + ay, then $a^2+b^2+c^2+2abc$ =

1) 2 2) a + b + c 3) 1 4) ab + bc + ca

13. If A = $\begin{bmatrix}2 & 2\\ -3 & 2\end{bmatrix}$, B = $\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$, then $(B^{-1}A^{-1})^{-1}$ =

1) $\begin{bmatrix}2 & -2\\ 2 & 3\end{bmatrix}$ 2) $\begin{bmatrix}3 & -2\\ 2 & 2\end{bmatrix}$

3) $\frac{1}{10}\begin{bmatrix}2 & 2\\ -2 & 3\end{bmatrix}$ 4) $\frac{1}{10}\begin{bmatrix}3 & 2\\ -2 & 2\end{bmatrix}$

14. A square matrix (a_{ij}) in which $a_{ij} = 0$ for $i \neq j$ and $a_{ij} = k$ (constant) for i = j is

1) Unit matrix 2) Scalar matrix
3) Null matrix 4) Diagonal matrix

15. If A = $\begin{bmatrix}0 & 2\\ 3 & -4\end{bmatrix}$, KA = $\begin{bmatrix}0 & 3a\\ 2b & 24\end{bmatrix}$, then the values of k, a, b are respectively

1) -6, -12, -18 2) -6, 4, 9
3) -6, -4, -9 4) -6, 12, 18

16. If A and B are two square matrices such that $B = -A^{-1}BA$ then $(A+B)^2$ =

1) 0 2) $A^2 + B^2$
3) $A^2 + 2AB + B^2$ 4) A + B

17. If A = $\begin{bmatrix}1 & 3\\ 2 & 1\end{bmatrix}$, then the determinant $A^2 - 2A$ is

1) 5 2) 25 3) -5 4) -25

18. If 'd' is the determinant of a square matrix A of order n, then the determinant of its adjoint is

1) d^n 2) d^{n-1} 3) d^{n-2} 4) d

19. If $a \neq 6$, b, c satisfy $\begin{vmatrix}a & 2b & 2c\\ 3 & b & c\\ 4 & a & b\end{vmatrix}$ = 0, then abc=

1) a + b + c 2) 0 3) b^3 4) ab + b - c

20. If $A(\alpha) = \begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$ then $A(\alpha)\,A(\beta)$ =

1) $A(\alpha) - A(\beta)$ 2) $A(\alpha) + A(\beta)$
3) $A(\alpha - \beta)$ 4) $A(\alpha + \beta)$

21. The real part of determinant of $\begin{bmatrix}\cos\alpha + i\sin\alpha & \cos\beta + i\sin\beta\\ \sin\beta + i\cos\beta & \sin\alpha + i\cos\alpha\end{bmatrix}$ is

1) 2 cos α 2) 2 sin β 3) 0 4) 1

22. If the matrix $\begin{bmatrix}\cos\theta & \sin\theta & 0\\ \sin\theta & \cos\theta & 0\\ 0 & 0 & 1\end{bmatrix}$ is singular, then θ =

1) π 2) π/2 3) π/3 4) π/4

23. If $x \neq 0$ and $\begin{vmatrix}1 & x & 2x\\ 1 & 3x & 5x\\ 1 & 3 & 4\end{vmatrix} = 0$, then x =

1) 1 2) -1 3) 2 4) -2

24. If $\begin{bmatrix}x & y^3\\ 2 & 0\end{bmatrix} = \begin{bmatrix}1 & 8\\ 2 & 0\end{bmatrix}$, then $\begin{bmatrix}x & y\\ 2 & 0\end{bmatrix}^{-1}$ =

1) $\begin{bmatrix}0 & -2\\ -2 & 1\end{bmatrix}$ 2) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

$\begin{bmatrix}0 & -8\\ -2 & 1\end{bmatrix}$ 4) $\begin{bmatrix}0 & \frac{1}{2}\\ \frac{1}{2} & -\frac{1}{4}\end{bmatrix}$

25. $\begin{vmatrix}x & 1 & y+z\\ y & 1 & z+x\\ z & 1 & x+y\end{vmatrix}$ =

1) 1 + x + y + z 2) x + y + z
3) 0 4) 1

26. The matrix $\begin{bmatrix}1 & 0 & 1\\ 2 & 1 & 0\\ 3 & 1 & 1\end{bmatrix}$ is

1) non-singular 2) singular
3) skew symmetric 4) symmetric

27. A non-singlar matrix A satisfies $A^2 - A + 2I = 0$, then A^{-1} =

1) 1 - A 2) $\frac{I-A}{2}$ 3) I + A 4) $\frac{(I+A)}{2}$

28. The system of equations 3x - 2y + z = 0, λx - 14y + 15z = 0 and x + 2y - 3z = 0 have non-zero solution, then λ =

1) 1 2) 3 3) 5 4) 0

29. If a + b + c = 0, then one root of $\begin{vmatrix}a-x & c & b\\ c & b-x & a\\ b & a & c-x\end{vmatrix} = 0$ is

1) a + b 2) 0
3) b + c 4) a + c

30. The inverse of the matrix $\begin{bmatrix}2 & 1\\ 1 & 3\end{bmatrix}$ is

1) $\frac{1}{5}\begin{bmatrix}2 & 1\\ 1 & 3\end{bmatrix}$ 2) $\frac{1}{5}\begin{bmatrix}3 & -1\\ -1 & 2\end{bmatrix}$

3) $\frac{1}{5}\begin{bmatrix}-3 & 1\\ -1 & 2\end{bmatrix}$ 4) $\frac{1}{5}\begin{bmatrix}-3 & 1\\ 1 & 2\end{bmatrix}$

31. If A = $\begin{bmatrix}\cos x & \sin x & 0\\ -\sin x & \cos x & 0\\ 0 & 0 & 1\end{bmatrix}$ = f(x) then A^{-1} =

1) f(- x) 2) f(x) 3) - f(x) 4) -f (-x)

32. If a, b, c are distinct and $\begin{vmatrix}a & a^2 & a^3-1\\ b & b^2 & b^3-1\\ c & c^2 & c^3-1\end{vmatrix}$ = 0, then

1) a + b + c = 1 2) ab + bc + ca = 0
3) a + b + c = 0 4) abc = 1

33. If the system of equations $x+y+z=6$, $x+2y+\lambda z=0$, $x+2y+3z=10$ has no solution, then $\lambda=$

1) 2 2) 3 3) 4 4) 5

34. $\begin{vmatrix} a+b & a & b \\ a & a+c & c \\ b & c & b+c \end{vmatrix} =$

1) 4abc 2) abc 3) $a^2b^2c^2$ 4) $4a^2b^2c^2$

35. The matrix A is such that $A\begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} -4 & 1 \\ 7 & 7 \end{bmatrix}$ then A =

1) $\begin{bmatrix} 1 & 1 \\ 2 & -3 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 1 \\ -2 & 3 \end{bmatrix}$

3) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ 4) $\begin{bmatrix} -1 & 1 \\ 2 & 3 \end{bmatrix}$

36. $A=\begin{bmatrix} 2 & 3 \\ 2 & -1 \end{bmatrix}$ then $8A^{-1}=$

1) $\begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 3 \\ -2 & 2 \end{bmatrix}$

3) $\begin{bmatrix} -1 & 3 \\ 2 & 2 \end{bmatrix}$ 4) $\begin{bmatrix} 1 & 3 \\ 2 & -2 \end{bmatrix}$

37. If A is a 3 x 3 matrix and det (3A) = k. det A, then k =

1) 9 2) 6 3) 1 4) 27

38. $\begin{vmatrix} x & 1 & y+z \\ y & 1 & z+x \\ z & 1 & x+y \end{vmatrix} =$

1) $1+x+y+z$ 2) $x+y+z$
3) 0 4) 1

39. If $\Delta = \begin{vmatrix} a-b-c & 2b & 2c \\ 2a & b-c-a & 2c \\ 2a & 2b & c-a-b \end{vmatrix}$ then $\Delta=$

1) $(a+b+c)^2$ 2) $(a+b+c)^4$
3) $(a+b+c)^3$ 4) $(a+b+c)$

40. $\det\begin{bmatrix} 1 & 1 & 1 \\ \sin A & \sin B & \sin C \\ \sin^2 A & \sin^2 B & \sin^2 C \end{bmatrix} =$

1) $\frac{1}{8R^3}(a-b)(b-c)(c-a)$

2) $8R^3(a-b)(b-c)(c-a)$

3) $(a-b)(b-c)(c-a)$

4) $\frac{1}{8R}(a-b)(b-c)(c-a)$

41. If A is 3 x 5 matrix, B is 2 x 3 matrix, then the order of the matrix BA is

1) 2 x 3 2) 3 x 2 3) 2 x 5 4) 5 x 2

42. (1 2 3) B = (3 4) then order of B is

1) 3 x 1 2) 1 x 3 3) 2 x 3 4) 3 x 2

43. If A is $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \lambda \end{bmatrix}$ is a singular matrix then $\lambda=$

1) 3 2) 4 3) 2 4) 5

44. The order of $[x\ y\ z]\begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix}$ is

1) 3 x 1 2) 1 x 1 3) 1 x 3 4) 3 x 3

45. If A and B are two matrices such that AB = B and BA = A then $A^2+B^2=$

1) 2AB 2) 2BA 3) A + B 4) AB

46. $\begin{pmatrix} 1 & 3 \\ 3 & 10 \end{pmatrix}^{-1} =$

1) $\begin{pmatrix} 10 & 3 \\ 3 & 1 \end{pmatrix}$ 2) $\begin{pmatrix} 10 & -3 \\ -3 & 1 \end{pmatrix}$

3) $\begin{pmatrix} 1 & 3 \\ 3 & 10 \end{pmatrix}$ 4) $\begin{pmatrix} -1 & -3 \\ -3 & -10 \end{pmatrix}$

47. If $A=\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ then $A^4=$

1) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ 2) $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$

3) $\begin{pmatrix} 0 & 0 \\ 1 & 1 \end{pmatrix}$ 4) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

48. $\begin{vmatrix} \sin^2 x & \cos^2 x & 1 \\ \cos^2 x & \sin^2 x & 1 \\ -10 & 12 & 2 \end{vmatrix} =$

1) 0
2) $12\cos^2 x - 10\sin^2 x + 2$
3) $12\sin^2 x - 10\cos^2 x - 2$ 4) $10\sin 2x$

49. The system of linear equations $x+y+z=2$, $2x+y-z=3$, $3x+2y+kz=4$ has a unique solution, if

1) $k\neq 0$ 2) $-1<k<1$
3) $-2<k<2$ 4) $k=0$

50. $\begin{vmatrix} 0 & p-q & p-r \\ q-p & 0 & q-r \\ r-p & r-q & 0 \end{vmatrix} =$

1) 0 2) (p - q) (q - r) (r - p)
3) pqr 4) 3 pqr

51. If $A=\begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ and A^2 is identity matrix, then x =

1) 1 2) -1 3) ± 1 4) 0

52. The roots of the determinantal equation $\begin{vmatrix} a & a & x \\ m & m & m \\ b & x & b \end{vmatrix} = 0$ are

1) a 2) b 3) a or b 4) 0, 0

53. Matrix A is such that $A^2=2A-I$ where I is the unit matrix. Then for $x\geq 2$, $A^n=$

1) nA - (n - 1)I 2) nA - I
3) $2^{n-1}A-(n-1)I$ 4) $2^{n-1}(A)-I$

54. $\begin{vmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{vmatrix} = k\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ then k =

1) 1 2) 2 3) 3 4) 4

55. If the traces of the matrices A and B are 20 and -8, then trace of A + B =

1) 28 2) 20 3) - 8 4) 12

56. If the system of equations $3x-2y+z=0$, $\lambda x-14y+15z=0$, $x+2y+3z=0$ have a non-trivial solution then $\lambda=$

1) 22 2) 24 3) 23 4) 29

57. If $X=\begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$ then X^n is

1) $\begin{pmatrix} 3n & -4n \\ n & -n \end{pmatrix}$ 2) $\begin{pmatrix} 2+n & 5-n \\ n & -n \end{pmatrix}$

3) $\begin{pmatrix} 3^n & (-4)^n \\ 1^n & (-1)^n \end{pmatrix}$ 4) None

58. $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2-bc & b^2-ca & c^2-ab \end{vmatrix} =$

1) 0 2) 2 3) 4 4) - 4

59. A is a 3 x 3 matrix and B is its adjoint matrix. If the determinent of B is 64, then the det A is

1) 4 2) ± 4 3) ± 8 4) 8

60. The inverse of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ is

1) $\begin{bmatrix} 1 & -2 & 7 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 2 & 7 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$

3) $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 7 & 2 & 1 \end{bmatrix}$ 4) $\frac{1}{2}\begin{bmatrix} 1 & 2 & -7 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$

PREVIOUS ECET BITS

2008

01. If $\begin{vmatrix} 1+x & 1-x & 1-x \\ 1-x & 1+x & 1-x \\ 1-x & 1-x & 1+x \end{vmatrix} = 0$, then $x =$

1) -1 2) 1 3) 2 4) 3

02. If $\begin{bmatrix} x & 1 & 1 \\ 2 & 3 & 4 \\ 1 & 1 & 1 \end{bmatrix}$ is a singular matrix, then the value of x is

1) -4 2) -3 3) -2 4) 1

03. For the system of equation $x+2y+3z=6$, $2x+y+2z=5, 3x+3y+5z=12$

1) $x=1, y=1, z=1$ is the only solution
2) No solution exists
3) Infinitely many solutions exist
4) $x=2, y=1, z=0$ is the only solution

2009

04. The minor of -2 in $\begin{bmatrix} 2 & 1 & 1 \\ 1 & -2 & -3 \\ 3 & 2 & 4 \end{bmatrix}$ is

1) -5 2) 5 3) 11 4) -2

05. If $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 3 & 2 \end{bmatrix}$, then det A is

1) -2 2) +2 3) 0 4) 6

06. The solution to system of linear equations $x-3y+2z=8x+4y+z=54x+2y-9z=2$ by Cramer's rule is

1) $x=7, y=-3, z=-4$
2) $x=1, y=2, z=3$
3) $x=7, y=3, z=4$
4) $x=-1, y=-2, z=-3$

2010

07. $\begin{vmatrix} y+z & x & y \\ y & z+x & y \\ z & z & x+y \end{vmatrix} =$

1) xyz 2) 2xyz 3) 3xyz 4) 4xyz

08. The determinant of an orthogonal matrix is

1) ± 1 2) <1 3) 0 4) >1

09. If $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ then $adj\ A =$

1) A 2) A^T 3) $2A^T$ 4) $3A^T$

2011

10. If $F(\alpha) = \begin{vmatrix} Cos\alpha & -Sin\alpha & 0 \\ Sin\alpha & Cos\alpha & 0 \\ 0 & 0 & 1 \end{vmatrix}$; $F(x), F(y) =$

1) $F(x-y)$ 2) $F(xy)$
3) $F(x+y)$ 4) $F(x^2+y^2)$

11. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then $A^2 =$

1) A^T 2) A^{-1} 3) I 4) A^3

12. If $A = \begin{bmatrix} 5 & x \\ y & 0 \end{bmatrix}$ and $A = A^T$ then

1) $x=0, y=5$ 2) $x+y=5$
3) $x=y$ 4) $x^2=1$

13. If $A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$ then

1) $A^2+B^2=I$ 2) $A^2=B^2=-I$
3) $A^2=I, B^2=-I$ 4) $A^2=-I, B^2=I$

14. If $a \neq b \neq c$ and $\begin{vmatrix} a & a^2 & a^3 & -1 \\ b & b^2 & b^3 & -1 \\ c & c^2 & c^3 & -1 \end{vmatrix} = 0$ then

1) $a+b+c=0$ 2) $abc=1$
3) $a+b+c=1$ 4) $ab+bc+ca=0$

15. If one root of the equation $\begin{vmatrix} 7 & 6 & x \\ 2 & x & 2 \\ x & 3 & 7 \end{vmatrix} = 7$ is $x=-9$. The other roots are

1) $(2,6)$ 2) $(3,6)$ 3) $(2,7)$ 4) $(3,7)$

2012

16. If $A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ then $A^4 =$

1) 3I 2) 9I 3) 27I 4) 81I

17. If $A = \begin{bmatrix} 0 & 2 & 1 \\ -2 & 0 & -2 \\ -1 & x & 0 \end{bmatrix}$ is a skew symmetric matrix, then the value of x is

1) 1 2) 2 3) 3 4) 4

18. What is the number of all possible matrices with each entry as 0 or 1 if the order of matrices is

1) 64 2) 268 3) 512 4) 256

19. If $A = \begin{bmatrix} 1 & i & -i \\ i & -i & 1 \\ -i & 1 & i \end{bmatrix}$ then $|A| =$

1) 1 2) 2 3) 3 4) 4

20. The solution of a system of linear equations $2x-y+3z=9$, $x+y+z$, $x-y+z=2$ is

1) $x=-1, y=-2, z=-3$
2) $x=3, y=2, z=1$ 3) $x=2, y=1, z=3$
4) $x=1, y=2, z=3$

2013

21. Given a matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ 5 & -6 & x \end{bmatrix}$ and if det (A) = 48, the value of x is

1) 0 2) 4 3) 7 4) 8

22. If A and B are symmetric matrices of same order then $(AB^T)^T =$

1) AB 2) BA 3) 1 4) -AB

23. Which of the following statements is FALSE

1) In a determinant the numbers of rows must be equal to the number of columns
2) In a determinant interchange of rows into columns does not alter the value of the determinant
3) In general, interchange of rows into columns and vice-versa produces the same matrix
4) A determinant can be reduced to a single number

24. If $A = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$, then $A^5 =$

1) 5A 2) 32 3) 16A 4) 32A

25. If the matrix A is such that $A\begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} -4 & 1 \\ 7 & 7 \end{bmatrix}$, then A =

1) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 1 \\ -2 & 3 \end{bmatrix}$ 3) $\begin{bmatrix} 3 & 1 \\ -2 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} -1 & 1 \\ 2 & 3 \end{bmatrix}$

2014

26. If $A = \begin{bmatrix} 2 & 4 & 3 \\ 1 & 0 & 2 \\ -3 & 5 & 1 \end{bmatrix}$ then,

1) $A = A^T$ 2) A is a diagonal matrix
3) A is a singular matrix
4) A is a nonsingular matrix

27. If A = $\begin{bmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ then

1) The minors of first row elements are respectively $-3, -1, 5$
2) The cofactors of second row elements respectively are 1, -1, 1
3) The cofactors of first row elements respectively are -3, -1, -5
4) The minors of second row elements respectively are 7, 5, -13

28. If A,B,C are non singular matrices of order 3 then

1) $A(BC) \neq (AB)C$

2) $(ABC)^T = A^T B^T C^T$

3) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

4) $(ABC)^{-1} = 1/(ABC)$

29. If $\begin{bmatrix} 3 & 2 \\ 2 & -3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$, then

1) $x = -1, y = 4$ 2) $x = 2, y = -1$
3) $x = 4, y = -1$ 4) $x = -1, y = 2$

30. If w is the cube root of unity then

$\begin{bmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{bmatrix} =$

1) 0 2) 1
3) -1 4) 2

A.P ECET-2015

31. If A and B are Skew-symmetry marices, then A+B is

1) orthogonal 2) symmetric
3) skew - symmetry 4) unitary

32. If n is an even natural number then

$\begin{bmatrix}\begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}\end{bmatrix}^n =$

1) null matrix of order 2 2) unit matrix of order 2
3) scalar matrix of order 2
4) unit matrix of order n

33. The determinant of orthogonal matrix is

1) 1 only 2) 0 3) ± 1 4) 2

34. If

$A - B = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}, A + B = \begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix}$, then AB =

1) $\begin{bmatrix} 4 & 10 \\ 3 & 8 \end{bmatrix}$ 2) $\begin{bmatrix} 4 & 3 \\ 10 & 8 \end{bmatrix}$

3) $\begin{bmatrix} 4 & -10 \\ -3 & 8 \end{bmatrix}$ 4) $\begin{bmatrix} 4 & 3 \\ 8 & 10 \end{bmatrix}$

35. If A = $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $A^{-1} =$

1) A 2) 2A 3) -A 4) 1

T.S ECET- 2015

36. If A $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ then AA^T is

1) 0 2) A 3) A^{-1} 4) I

37. The determinant of the martix $\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{bmatrix}$ is:

1) 0 2) 1 3) (a+b) (b+c) (c+a)
4) (a-b) (b-c) (c-a)

38. If A = $\begin{bmatrix} 2 & -1 & 1 \\ x & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ is singular matrix then x is equal to:

1) 0 2) 1 3) 2 4) 3

39. The determinant of the martix $\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$ is

1) 0 2) 1
3) $3abc + a^3 + b^3 + c^3$
4) $3abc - a^3 - b^3 - c^3$

40. Using cramer's rule, the x balue from the equations

$x + y + z = 9;$ $2x + 5y + 7z = 52;$
$2x + y - z = 0;$ is:

1) 0 2) 1 3) 2 4) 3

A.P ECET-2016

41. If $x \neq 0$ and $\begin{vmatrix} 1 & x & 2x \\ 1 & 3x & 5x \\ 1 & 3 & 4 \end{vmatrix} = 0$, then $x =$

1) 1 2) -1 3) 2 4) -2

42. If $A = \begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ is an involutory matrix then x =

1) 0 2) 2 3) -1 4) 2

43. The equations x+2y+3z=1, 2x+y+3z=2, 4x+5y+9z=4 have
1) a unique solution 2) no solution
3) infinite number of solutions
4) two solutions

44. If A is a 2×2 matrix and det (2A) =k det (A)then k=
1) 2 2) 4 3) 6 4) 8

45. If A,B are two matrices and AB=B, BA=A then $A^2 + B^2 =$
1) A+B 2) A-B 3) AB 4) 0

T.S ECET-2016

46. If $A = \begin{bmatrix} -1 & 2 \\ 2 & 3 \end{bmatrix}; B = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$, then $(A+B)^2 =$

1) $\begin{bmatrix} 10 & 18 \\ 12 & 22 \end{bmatrix}$ 2) $\begin{bmatrix} 10 & 12 \\ 18 & 22 \end{bmatrix}$

3) $\begin{bmatrix} 9 & 4 \\ 4 & 11 \end{bmatrix}$ 4) $\begin{bmatrix} 5 & 6 \\ 7 & 11 \end{bmatrix}$

47. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, then $A^2 =$

1) $\begin{bmatrix} 9 & 8 & 7 \\ 8 & 8 & 8 \\ 8 & 7 & 9 \end{bmatrix}$ 2) $\begin{bmatrix} 8 & 7 & 9 \\ 9 & 8 & 9 \\ 7 & 8 & 9 \end{bmatrix}$

3) $\begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$ 4) $\begin{bmatrix} 6 & 7 & 8 \\ 7 & 6 & 8 \\ 7 & 8 & 9 \end{bmatrix}$

48. $\begin{vmatrix} a-b & m-n & x-y \\ b-c & n-p & y-z \\ c-a & p-m & z-x \end{vmatrix} =$

1) abcmnpxyz 2) 1 3) 0 4) 3

49. The inverse of the matrix $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ is

1) $\begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ 2) $\frac{1}{2}\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

3) $\begin{bmatrix} -\cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ 4) $\begin{bmatrix} \sin\alpha & \cos\alpha \\ -\cos\alpha & \sin\alpha \end{bmatrix}$

50. If $A=\begin{bmatrix}4-5i & 3+4i\\ 2 & 4-5i\end{bmatrix}$, then adjA=

1) $\begin{bmatrix}4+5i & 3-4i\\ 2 & 4-5i\end{bmatrix}$ 2) $\begin{bmatrix}4-5i & 3+4i\\ -2 & 4+5i\end{bmatrix}$

3) $\begin{bmatrix}4-5i & 3-4i\\ 2 & 4-5i\end{bmatrix}$ 4) $\begin{bmatrix}4-5i & -3-4i\\ -2 & 4-5i\end{bmatrix}$

A.P ECET-2017

51. If the traces of A and B are 20 and -8 then the trace of (A+B) is____

1) 12 2) -12 3) 28 4) -28

52. If $A=\begin{bmatrix}x & 1\\ 1 & 0\end{bmatrix}$ is an involutory matrix then x =

1) 0 2) -2 3) -1 4) 2

53. The determinant of $\begin{bmatrix}\log e & \log e^2 & \log e^3\\ \log e^2 & \log e^3 & \log e^4\\ \log e^3 & \log e^4 & \log e^5\end{bmatrix}$ is

1) 0 2) 1 3) 4 log e 4) 5log e

54. If $A=\begin{bmatrix}1 & 1 & 0\\ 2 & 1 & 3\\ 0 & 1 & 2\end{bmatrix}$ then det (adjA) = ____

1) detA 2) Det A^2 3) -detA 4) $(\det A)^2$

55. If A,B are two matrices and AB=B, BA=A the $A^2+B^2=$

1) A+B 2) A-B 3) AB 4) 0

T.S ECET-2017

56. If $A+B=\begin{bmatrix}1 & -1\\ 3 & 0\end{bmatrix}$ and $A-B=\begin{bmatrix}3 & 1\\ 1 & 4\end{bmatrix}$, then AB=

1) $\begin{bmatrix}-2 & 2\\ 0 & -6\end{bmatrix}$ 2) $\begin{bmatrix}-2 & -2\\ 2 & -4\end{bmatrix}$

3) $\begin{bmatrix}-2 & -2\\ 0 & -6\end{bmatrix}$ 4) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

57. If $A=\begin{bmatrix}1\\ 0\\ 2\end{bmatrix}; B=\begin{bmatrix}1 & -1 & 0\\ 0 & 2 & 3\\ 4 & 0 & -1\end{bmatrix}$, then $A^TBA=$

1) [5] 2) [0]

3) $\begin{bmatrix}1 & -1 & 0\\ 0 & 1 & 0\\ 0 & 6 & -2\end{bmatrix}$ 4) $\begin{bmatrix}1 & -1 & 0\\ 0 & 2 & 3\\ 4 & 0 & -1\end{bmatrix}$

58. $\begin{vmatrix}x-y & p-q & a-b\\ y-z & q-r & b-c\\ z-x & r-p & c-a\end{vmatrix}=$

1) 1 2) 2 3) xyz - pqr + abc 4) 0

59. The solution of the equation $\begin{vmatrix}5-x & 4 & 3\\ 1-3x & 7 & 6\\ 1-x & 6 & 5\end{vmatrix}=0$ is

1) x=1 2) x = 2 3) x = 0 4) x = 5

60. The inverse of the matrix $A=\begin{bmatrix}a+ib & c+id\\ -c+id & a-ib\end{bmatrix}$ if $a^2+b^2+c^2+d^2=1$ is

1) $\begin{bmatrix}a-ib & c-id\\ c+id & a+ib\end{bmatrix}$ 2) $\begin{bmatrix}a-ib & -c-id\\ c-id & a+ib\end{bmatrix}$

3) $\begin{bmatrix}a-ib & a-id\\ a+ib & c+id\end{bmatrix}$ 4) $\begin{bmatrix}a-ib & c-id\\ -c+id & a+ib\end{bmatrix}$

A.P ECET-2018

61. The value of $\begin{vmatrix}265 & 240 & 219\\ 240 & 225 & 198\\ 219 & 198 & 181\end{vmatrix}$ is

1) -1 2) 0 3) 1 4) 2

62. If two rows or two columns of a determinat are identical then the value of the determinant is

1) 2 2) -1 3) 0 4) -2

63. If $A=\begin{pmatrix}2 & -1 & 0\\ 3 & 4 & 7\end{pmatrix}$ and $B=\begin{pmatrix}5 & 2 & -3\\ 1 & 0 & -2\end{pmatrix}$ then 2A+3B=

1) $\begin{pmatrix}19 & 4 & -9\\ 9 & 8 & 8\end{pmatrix}$ 2) $\begin{pmatrix}-19 & -4 & 9\\ 9 & 8 & -8\end{pmatrix}$

3) $\begin{pmatrix}18 & 4 & -9\\ 9 & 8 & 8\end{pmatrix}$ 4) $\begin{pmatrix}17 & 5 & -9\\ 8 & 8 & 9\end{pmatrix}$

64. If $A=\begin{pmatrix}2 & -3 & 0\\ 1 & 4 & -1\end{pmatrix}$ and $B=\begin{pmatrix}6 & 1\\ 3 & 0\\ 5 & 2\end{pmatrix}$ then $(AB)^T=$

1) A^TB^T 2) B^TA^T 3) $(BA)^T$ 4) AB^T

65. The adjoint of the square matrix $A=\begin{pmatrix}2 & 5 & 1\\ 3 & 1 & 2\\ 4 & 3 & 1\end{pmatrix}$ is

1) $\begin{pmatrix}-5 & -2 & 9\\ 5 & -2 & -1\\ 5 & 14 & -13\end{pmatrix}$ 2) $\begin{pmatrix}5 & 2 & 9\\ 5 & -2 & -1\\ 5 & 14 & -13\end{pmatrix}$

3) $\begin{pmatrix}-5 & -2 & 9\\ -5 & -2 & -1\\ -5 & 14 & -13\end{pmatrix}$ 4) $\begin{pmatrix}-5 & -2 & -9\\ 5 & 2 & 1\\ 5 & 14 & -13\end{pmatrix}$

T.S ECET-2018

66. If A is square matrix of order 3 and if the matrix obtained by replacing the elemetns of A with their corresponding cofactors is $\begin{bmatrix}1 & -2 & 1\\ 4 & -5 & -2\\ -2 & 4 & 1\end{bmatrix}$ then determinat of A is ____

1) 9 2) 16 3) 3 4) 4

67. The system of equations $x+y+z=6, x+2y+3z=10, x+2y+\lambda z=K$ is inconsistent for $\lambda=1$ and $K\neq m$, then (1,m) =

1) (3, 7) 2) (3, 10) 3) (7, 10) 4) (10, 4)

68. If A is a square matrix of order n and A=P+Q, where P is symmetric and Q is non symmetric matrices, then P-Q=

1) A 2) A^T 3) $A+A^T$ 4) $A-A^T$

69. If $A=\begin{bmatrix}1 & 2 & 2\\ 2 & 1 & x\\ -2 & y & -1\end{bmatrix}$ is orthogonal then______

1) $x=-2, y=2$ 2) x=-2, y= -2

3) x=2, y=2 4) x=2, y=-2

70. $X=\begin{bmatrix}1 & 1 & 1\\ 1 & 2 & 3\\ 1 & 3 & k\end{bmatrix}$ is singular matrix then k =

1) 2 2) 3 3) 4 4) 5

PREVIOUS ECET BITS KEY

01) 4	02) 4	03) 3	04) 2	05) 2
06) 1	07) 4	08) 1	09) 4	10) 3
11) 2	12) 3	13) 2	14) 1	15) 3
16) 4	17) 2	18) 3	19) 2	20) 4
21) 4	22) 2	23) 3	24) 3	25) 1
26) 4	27) 2	28) 3	29) 2	30) 1
31) 3	32) 3	33) 3	34) 1	35) 1
36) 4	37) 4	38) 4	39) 4	40) 1
41) 2	42) 1	43) 3	44) 2	45) 1
46) 2	47) 3	48) 3	49) 1	50) 4
51) 1	52) 1	53) 1	54) 4	55) 1
56) 1	57) 1	58) 4	59) 1	60) 2
61) 2	62) 3	63) 1	64) 2	65) 1
66) 3	67) 2	68) 2	69) 1	70) 4

SPACE FOR IMPORTANT NOTES

PARTIAL FRACTIONS

1. Polynomial :
An expression of the form $a_0x^n + a_1x^{n-1} + a_2x^{n-2} + ... + a_{n-1}x + a_n$, where n is a positive integer and $a_0, a_1, a_2, ..., a_n$ are real numbers and $a_0 \neq 0$ is called a polnomial of degree n in x.

2. Rational Fraction :
The quotient of two polynomials f(x) and g(x) where $g(x) \neq 0$ is called a rational fraction.

3. Proper and Improper Fractions:
If the degree of f(x) is less than the degree of g(x) in a rational fraction $\frac{f(x)}{g(x)}$, then it is called a proper fraction.

Otherwise, the rational fraction is called an improper fraction.

4. Resolving a given fraction into partial fractions is nothing but expressing it as the sum of two or more simler (proper) fractions.

5. If an improper rational fraction $\frac{f(x)}{g(x)}$ is given, for splitting into partial fractions, then divide f(x) with g(x) till we get a remainder R(x) of lower degree than g(x).

Then $\frac{f(x)}{g(x)}$ should be expressed in the form $\frac{f(x)}{g(x)} =$ Quotient $+ \frac{R(x)}{g(x)}$ Now we resolve the proper fraction into its partial fractions using the following rules:

6. Case (i) : When g)x) contains non-repeated linear factors only

$$\frac{f(x)}{(a_1x+b_1)(a_2x+b_2)...(a_nx+b_n)} = \frac{A_1}{a_1x+b_1} + \frac{A_2}{a_2x+b_2} + ... + \frac{A_n}{a_nx+b_n}$$

where A_1, A_2, ...A_n are constants to be found.

Case (ii) : When g(x) contains repeated and non repeated linear factors only.

$$\frac{f(x)}{(a_1x+b_1)(a_2x+b_2)...(a_nx+b_n)} = \frac{A}{a_1x+b_1} + \frac{B}{(a_1x+b_1)^2} + \frac{C}{a_2x+b_2}$$

Where A, B and C are constants to be determined.

Case (iii) : When g(x) contains on - repeated irreducible quadratic factors only.

$$\frac{f(x)}{(a_1x^2+b_1x+c_1)(a_2x+b_2)} = \frac{Ax+B}{a_1x^2+b_1x+c_1} + \frac{C}{a_2x+b_2}$$

where A, B and C are constants to be found.

Case (iv) : When g(x) contains repeated and non repeated irreducible quadratic factors.

$$\frac{f(x)}{(a_1x^2+b_1x+c_1)^2(a_2x^2+b_2x+c_2)} = \frac{A_1x+B_1}{a_1x^2+b_1x+c_1} + \frac{A_2x+B_2}{(a_1x^2+b_1x+c_1)} + \frac{A_3x+B_3}{a_2x^2+b_2x+c_2}$$

where A_1, A_2, B_2 and A_3, B_3 are constants to be determined.

7. Remainder Theorem :
If the polynomial f(x) is divided by x -a, then the remainder is f(a).
1. If the polynomial f(x) is divided by x + a, then the remainder is f(-a).
2. If the plynomial f(x) is divided by ax +b, then the remainder is $f\left(-\frac{b}{a}\right)$.

8. Factor Theorem:
If f(a) = 0 then f(x) is divisible by (x-a), i.e., (x-a) is a factor of f(x).
Note: 1. If f(-a) =0, then (x+a) is a factor of f(x)
2. If $f\left(-\frac{a}{b}\right) = 0$ then (bx+a) is a factor of f(x)
3. If f (a) = 0 and also f(b) = 0, then f(x) is divisible by (x-a) (x-b)

9. Some Important Results :

(i) $\frac{1}{x(x+a)} = \frac{1}{a}\left(\frac{1}{x} - \frac{1}{x+a}\right)$

(ii) $\frac{1}{x(x-a)} = \frac{1}{a}\left(\frac{1}{x-a} - \frac{1}{x}\right)$

(iii) $\frac{1}{(x-a)(x-b)} = \frac{1}{a-b}\left(\frac{1}{x-a} - \frac{1}{x-b}\right)$

(iv) $\frac{1}{(x+a)(x+b)} = \frac{1}{b-a}\left(\frac{1}{x+a} - \frac{1}{x+b}\right)$

(v) $\frac{f(x)}{(x+a)(x+b)} = \frac{f(-a)}{(x+a)(-a+b)} + \frac{f(-b)}{(x+b)(-b+a)}$

(vi) $\frac{1}{(ax+b)(cx+d)} = \frac{1}{ad-bc}\left(\frac{a}{ax+b} - \frac{c}{cx+d}\right)$

(vii) $\frac{1}{x^2-a^2} = \frac{1}{2a}\left(\frac{1}{x-a} - \frac{1}{x+a}\right)$

(viii) $\frac{1}{a^2-x^2} = \frac{1}{2a}\left(\frac{1}{a-x} + \frac{1}{a+x}\right)$

(ix) $\frac{1}{x^3(x+a)} = \frac{1}{a^3x} - \frac{1}{a^2x^2} + \frac{1}{ax^3} - \frac{1}{a^3(x+a)}$

(x) $\frac{1}{(x^2+a^2)(x^2+b^2)} = \frac{1}{b^2-a^2}\left(\frac{1}{x^2+a^2} - \frac{1}{x^2+b^2}\right)$

(xi) $\frac{x^2}{(x^2+a^2)(x^2+b^2)} = \frac{1}{a^2-b^2}\left(\frac{a^2}{x^2+a^2} - \frac{b^2}{x^2+b^2}\right)$

(xii) $\frac{1}{(x^2+a^2)(x^2+b^2)(x^2+c^2)} = \frac{1}{(b^2-a^2)(c^2-a^2)(x^2+c^2)} + \frac{1}{(c^2-b^2)(a^2-b^2)(x^2+b^2)} + \frac{1}{(a^2-c^2)(b^2-c^2)(x^2+c^2)}$

(xiii) $\frac{x^2}{(x-a)(x-b)} = 1 + \frac{a^2}{(a-b)(x-a)} + \frac{b_2}{(b-a)(x-b)}$

(xiv) $(x-a)(x-b) = x^2 - (a+b)x + ab$

(xv) $(x-a)(x-b)(x-c) = x^3 - (a+b+c)x^2 + (ab+bc+ca)x - abc$

(xvi) $(x-a)(x-b)(x-c)(x-d) = x^4 - (a+b+c+d)x^3 + (ab+ac+ad+bc+bd+cd)x^2 - (abc+abd+acd+bcd)x + abcd$

ALL POWER IS WITHIN
YOU
YOU CAN DO
ANYTHING
AND
EVERYTHING

PRACTICE SET - I

01. Number of partial fractions of $\frac{3x+4}{(x+1)^2(x-1)}$ is

1) 4 2) 3 3) 2 4) 1

02. Number of partial fractions of $\frac{2x+1}{(x-1)(x^2+1)}$ is

1) 1 2) 2 3) 3 4) 4

03. Number of partial fractions of $\frac{x+2}{x^2(x^2-1)}$ is

1) 1 2) 2 3) 3 4) 4

04. Number of partial fractions of $\frac{3x-5}{(x+1)^3(x^2+1)^2}$ is

1) 3 2) 4 3) 5 4) 6

05. Number of partial fractions of $\frac{2x+3}{x^2(x^2-1)^3}$ is

1) 5 2) 6 3) 7 4) 8

06. The remainder obtained when the polynomial $1+x+x^3+x^9+x^{27}+x^{81}+x^{243}$ is divided by x - 1 is

1) 2 2) 5 3) 7 4) 11

07. The remainder obtained when the polynomial $x^{64}+x^{27}+1$ is divided by x+1 is

1) 1 2) -1 3) 2 4) - 4

08. Partial fractions of $\frac{1}{x^2-4} =$

1) $\frac{1-2x}{x^2-4}$ 2) $\frac{1}{x-2} + \frac{1}{x+2}$ 3) $\frac{1}{4}\left(\frac{1}{x+2} - \frac{1}{x-2}\right)$ 4) $\frac{1}{4}\left(\frac{1}{x-2} - \frac{1}{x+2}\right)$

09. Partial fractions of $\frac{x-4}{x^2-5x+6} =$

1) $\frac{2}{x-2} - \frac{1}{x-3}$ 2) $\frac{2}{x+2} - \frac{1}{x+3}$

3) $\frac{1}{x-2} - \frac{2}{x-3}$ 4) $\frac{1}{x-2} + \frac{2}{x-3}$

10. If $\frac{1}{(x-a)(x-b)} = \frac{-1}{2(x-a)} + \frac{k}{x-b}$, then $k =$

1) 1 2) -1 3) $\frac{1}{2}$ 4) 2

11. The partial fractions of $\frac{x^2+1}{x(x^2-1)}$ are

1) $\frac{1}{x} - \frac{1}{x+1} + \frac{1}{x-1}$

2) $-\frac{1}{x} + \frac{1}{x+1} + \frac{1}{x-1}$

3) $\frac{1}{x} - \frac{1}{x+1} + \frac{1}{x-1}$

4) $\frac{1}{x} + \frac{1}{x+1} - \frac{1}{x-1}$

12. The partital fractions of $\frac{x+1}{x^2+5x+6}$ are

1. $\frac{1}{x+2} + \frac{1}{x+3}$ 2. $\frac{-1}{x+2} + \frac{1}{x+3}$

3. $\frac{-1}{x+2} + \frac{2}{x+3}$ 4. $\frac{1}{x+2} - \frac{2}{2+3}$

13. Partial fractions of $\frac{3x-20}{x^2+3x-10} =$

1) $\frac{2}{x+5} + \frac{5}{x-1}$ 2) $\frac{5}{x+5} - \frac{2}{x-2}$

3) $\frac{3}{x+5} - \frac{2}{x-2}$ 4) $\frac{2}{x+5} + \frac{3}{x-2}$

14. $\frac{1}{a^2-x^2}=$

1) $\frac{1}{a(a-x)}+\frac{1}{2a(a+x)}$

2) $\frac{1}{3a(a-x)}+\frac{1}{2a(a+x)}$

3) $\frac{1}{2a(a-x)}+\frac{1}{2a(a+x)}$

4) $\frac{1}{2a(a-x)}+\frac{1}{a(a+x)}$

15. $\frac{1}{x^2-a^2}=$

1) $\frac{1}{a(x-a)}+\frac{1}{2a(x+a)}$

2) $\frac{1}{3a(x-a)}+\frac{1}{2a(x+a)}$

3) $\frac{1}{2a(x-a)}-\frac{1}{2a(x+a)}$

4) $\frac{1}{2a(x-a)}+\frac{1}{a(x+a)}$

16. The partial fractions of $\frac{1}{(x^2+9)(x^2+16)}$ are

1) $\frac{1}{7}\left[\frac{1}{x^2+9}-\frac{1}{x^2+16}\right]$

2) $\frac{1}{9}\left[\frac{1}{x^2+9}-\frac{1}{x^2+16}\right]$

3) $\frac{1}{7}\left[\frac{1}{x^2+16}-\frac{1}{x^2+9}\right]$

4) $\frac{1}{25}\left[\frac{1}{x^2+9}-\frac{1}{x^2+16}\right]$

17. If $\frac{x^2+5}{(x^2+2)}=\frac{1}{x^2+2}+\frac{k}{(x^2+2)^2}$ then $K=$

1) 1 2) 2 3) 3 4) 4

18. If $\frac{1}{x^3(x+3)}=\frac{1}{Ax}-\frac{1}{Bx^2}+\frac{1}{Cx^3}-\frac{1}{D(x+3)}$ th[en]

A =

1) 3 2) 6 3) 9 4) 2

19. If $\frac{x-4}{x^2-5x-2k}=\frac{2}{x-2}-\frac{1}{x+k}$ then k =

1) -3 2) -2 3) 2 4) 4

20. If $\frac{3x}{(x-a)(x-b)}=\frac{2}{x-a}+\frac{1}{x-b}$ a : b =

1) 1:2 2) -2:1 3) 1:3 4) 3:

21. $\frac{x+1}{(2x-1)(3x+1)}=\frac{A}{2x-1}+\frac{B}{3x+1}$

$\Rightarrow 16A+9B=$

1) 4 2) 5 3) 6 4) 8

22. If $\frac{ax+b}{(3x+4)^2}=\frac{1}{3x+4}-\frac{3}{(3x+4)^2}$ then a + b =

1) 3 2) 4 3) 5 4) 6

23. If $\frac{42-19x}{(x^2+1)(x-2)}=\frac{A}{x-2}+\frac{Bx+C}{x^2+1}$ then A =

1) $\frac{2}{5}$ 2) $\frac{-2}{5}$ 3) $\frac{-4}{5}$ 4) $\frac{4}{5}$

24. If $\frac{x^2+1}{(x-2)(x^2+4)}=\frac{A}{x-2}+\frac{Bx+C}{x+4}$ then

A + C =

1) -1 2) 1 3) 2 4) 1/

25.

$\frac{3x^2+x+1}{(x-1)^4}=\frac{a}{(x-1)}+\frac{b}{(x-1)^2}+\frac{c}{(x-1)^3}+\frac{d}{(x-1)}$

$\Rightarrow\begin{bmatrix}a & b\\ c & d\end{bmatrix}=$

1) $\begin{bmatrix}3 & 7\\ 5 & 0\end{bmatrix}$ 2) $\begin{bmatrix}0 & 3\\ 7 & 5\end{bmatrix}$

3) $\begin{bmatrix}0 & 7\\ 3 & 5\end{bmatrix}$ 4) $\begin{bmatrix}3 & 5\\ 7 & 0\end{bmatrix}$

PRACTICE SET-I KEY

01) 2	02) 2	03) 4	04) 3	05) 4
06) 3	07) 1	08) 4	09) 1	10) 3
11) 2	12) 3	13) 2	14) 3	15) 3
16) 1	17) 3	18) 4	19) 1	20) 2
21) 3	22) 2	23) 4	24) 3	25) 2

PRACTICE SET - II

01. If $\frac{1}{(1-2x)(1+3x)}=\frac{A}{1-2x}+\frac{B}{1+3x}$ then 2B =

1. A 2. 2A 3. 3A 4. -3A

02. $\frac{x+1}{(2x-1)(3x+1)}=\frac{A}{2x-1}+\frac{B}{3x+1}\Rightarrow 16A+9B=$

1. 4 2. 5 3. 6 4. 8

03. If $\frac{3x}{(x-6)(x+a)}=\frac{2}{x-6}+\frac{1}{x+a}$ then a =

1. 2 2. -3 (3) 3 4. -2

04. If $\frac{3x}{(x-a)(x-b)}=\frac{2}{x-a}+\frac{1}{x-b}$ then a : b =

1. 1:2 2. -2:1 3. 1:3 4. 3:1

05. If $\frac{x^2-5x+1}{(x+1)(x+2)(x+3)}=\frac{a}{x+1}+\frac{b}{(x+1)(x+2)}+$

$\frac{c}{(x+1)(x+2)(x+3)}$, then

1. a = 1 2. b = 10 3. c=25 4. none of these

06. $\frac{x^2+x+1}{(x-1)(x-2)(x-3)}=\frac{A}{x-1}+\frac{B}{x-2}+\frac{C}{x-3}$

$\Rightarrow A+C=$

1) 4 2) 5 3) 6 4) 8

07. $\frac{x^3}{(2x-1)(x+2)(x-3)}=A+\frac{B}{2x-1}+\frac{C}{x+2}+$

$\frac{D}{x-3}\Rightarrow A=$

1. $\frac{1}{2}$ 2. $\frac{-1}{50}$ 3. $\frac{-8}{25}$ 4. $\frac{27}{25}$

08. If $\frac{x^4}{(x-a)(x-b)(x-c)}=x+k+\frac{A}{x-a}+\frac{B}{x-b}+$

$\frac{C}{x-c}$ then k =

1. a - b- c 2. a + b+c 3. -a +b+c 4. -(a+b+c)

09. If $\frac{(1+x)(1+2x)(1+3x)}{(1-x)(1-2x)(1-3x)}=k+\frac{A}{1-x}+\frac{B}{1-2x}+$

$\frac{C}{1-3x}$ then

1. k=6 2. A=12 3. B =30 4. C = 20

10. If $\frac{x^3}{(x-1)(x+2)}=x+k+\frac{A}{x-1}+\frac{B}{x+2}$ then k =

1. 1 2. -1 3. 3 4. -2

11. If $\frac{x^2+x+1}{x^2+2x+1}=A+\frac{B}{x+1}+\frac{C}{(x+1)^2}$ then A-B =

1. 4C 2. 4C+1 3. 3C 4. 2C

12. $\frac{(x-a)(x-b)}{(x-c)(x-d)}=\frac{A}{x-c}-\frac{B}{(x-d)}+C\Rightarrow C=$

1) 5 2) 4 3) 3 4) 1

13. $\frac{2x+1}{(x-1)(x^2+1)}=\frac{A}{x-1}+\frac{Bx+C}{x^2+1}\Rightarrow\frac{A-B}{C}=$

1. 2 2. 4 3. 6 4. 8

14. If $\frac{3x+2}{(x+1)(2x^2+3}=\frac{A}{x+1}+\frac{Bx+C}{2x^2+3}$ then A+C-

B=

1. 0 2. 2 3. 3 4. 5

15. If $\frac{(x+1)^2}{x^3+x}=\frac{A}{x}+\frac{Bx+C}{x^2+1}$ then $\sin^{-1}\left(\frac{A}{C}\right)=$

1. $\frac{\pi}{6}$ 2. $\frac{\pi}{4}$ 3. $\frac{\pi}{3}$ 4. $\frac{\pi}{2}$

16. If $\frac{1}{x(x^2+a^2)}=\frac{A}{x}+\frac{Bx+C}{x^2+a^2}$ then $\tan^{-1}\left(\frac{A}{B}\right)=$

1. $\frac{\pi}{3}$ 2. $\frac{\pi}{4}$ 3. $\frac{-\pi}{4}$ 4. $\frac{3\pi}{4}$

17. $\frac{1}{x^4+1}=$

1) $\frac{x+\sqrt{2}}{2\sqrt{2}(x^2+\sqrt{2}x-1)}+\frac{\sqrt{2}-x}{2\sqrt{2}(x^2+\sqrt{2}x-1)}$

2) $\frac{x+\sqrt{2}}{2\sqrt{2}(x^2+\sqrt{2}x+1)}+\frac{\sqrt{2}-x}{2\sqrt{2}(x^2-\sqrt{2}x+1)}$

3) $\frac{x+\sqrt{2}}{2\sqrt{2}(x^2+\sqrt{2}x-1)}+\frac{\sqrt{2}-x}{2\sqrt{2}(x^2-\sqrt{2}x+1)}$

4) $\frac{x+\sqrt{2}}{2\sqrt{2}(x^2-\sqrt{2}x+1)}+\frac{\sqrt{2}-x}{2\sqrt{2}(x^2-\sqrt{2}x+1)}$

18. The number of partial fractions of $\frac{x^2+3x+1}{(x-1)^5}$ is

1. 2 2. 3 3. 4 4. 5

19. If $\frac{x^4+24x^2+28}{(x^2+1)^3}=\frac{Ax+B}{x^2+1}+\frac{Cx+D}{(x^2+1)^2}+\frac{Ex+F}{(x^2+1)^3}$ then B =

1. 0 2. 1 3. -1 4. 2

20. If $\frac{x^2+x+1}{x^2+2x+1}=A+\frac{B}{x+1}+\frac{C}{(x+1)^2}\Rightarrow A+B+C=$

1. 1 2. 1 3. 0 4. 1/2

21. The no of P.F of $\frac{1}{x^4+x^6}=$

1. 1 2. 3 3. 2 4. 6

22. If $\frac{2x+1}{(x-1)(x^2+1)}=\frac{A}{x-1}+\frac{Bx+C}{x^2+1}$ then A+B+C =

1. 1 2. $\frac{1}{2}$ 3. $\frac{1}{3}$ 4. $\frac{1}{4}$

23. Number of partial fractions of $\frac{3x^2+70x-73}{(x-1)^4}$ is

1. 2 2. 3 3. 4 4. 5

24. If $\frac{x}{(x+a)(x+b)}=\frac{1}{k}\left(\frac{a}{x+a}-\frac{b}{x+b}\right)$, then k

1. a-b 2. a+b 3. b-a 4. 1

25. If $\frac{2x-1}{(9x-1)(2x+3)}=\frac{1}{5(x-1)}+\frac{k}{5(2x+3)}$, then k

1. 6 2. 7 3. 8 4. 9

26. If $\frac{(1+x)(1+2x)(1+3x)}{(1-x)(1-2x)(1-3x)}$ = k

$\frac{A}{1-x}+\frac{B}{1-2x}+\frac{C}{1-3x}$ then k =

1. 1 2. -1 3. 2 4. 3

27. If $\frac{x^4}{x^2-3x+2}=x^2+3X+k$

$-\frac{1}{x-1}+\frac{16}{x-2}$ then k =

1. 1 2. 7 3. 8 4. 9

28. If $\frac{x^3}{(x-a)(x-b)(x-c)}=$

$=k+\frac{A}{x-a}+\frac{B}{x-b}+\frac{C}{x-c}$ then k =

1. 1 2. a+b+c 3. abc 4. -1

29. If $\frac{x^4}{(x-1)(x-2)}=ax^2+bx+c+\frac{16}{x-2}-\frac{1}{x-1}$

then c =

1. 1 2. 3 3. 7 4. -5

30. If $\frac{1-x+6x^2}{x-x^3}=\frac{A}{x}+\frac{B}{1-x}+\frac{C}{1+x}$ then k =

1. 1 2. 2 3. 3 4. 4

31. Let a, b, c be such that

$\frac{1}{(1-x)(1-2x)(1-3x)}=\frac{a}{1-x}+\frac{b}{1-2x}+\frac{c}{1-3x}$

then $\frac{a}{1}+\frac{b}{3}+\frac{c}{5}=$

1. $\frac{1}{15}$ 2. $\frac{1}{6}$ 3. $\frac{1}{5}$ 4. $\frac{1}{3}$

32. If $\frac{x-4}{x^2-5x+6}$ can be expanded in the ascedndign powers of x, then the coefficient of x^3 is

1. $\frac{-73}{648}$ 2. $\frac{73}{648}$ 3. $\frac{71}{648}$ 4. $\frac{-71}{648}$

33. $\frac{x^3}{(2x-1)(x+2)(x-3)}=\Rightarrow A=$

1. $\frac{1}{2}$ 2. $\frac{1}{50}$ 3. $-\frac{8}{25}$ 4. $\frac{27}{15}$

34. If $\frac{3x+2}{(x+1)+(2x^2+3)}=\frac{A}{x+1}+\frac{Bx+C}{2x^2+3}$ then A + C - B =

1. 0 2. 2 3. 3 4. 5

35. If $\frac{x^2+x+1}{x^2+2x+1}=A+\frac{B}{x+1}+\frac{C}{(x+1)^2}$ then A - B =

1. 4c 2. 4C+1 3. 3C 4. 2C

PRACTICE SET-II KEY

01) 3	02) 3	03) 3	04) 2	05) 1
06) 4	07) 1	08) 2	09) 2	10) 2
11) 4	12) 4	13) 3	14) 2	15) 1
16) 3	17) 2	18) 2	19) 2	20) 2
21) 3	22) 2	23) 1	24) 1	25) 3
26) 2	27) 2	28) 1	29) 3	30) 1
31) 1	32) 1	33) 1	34) 2	35) 4

PREVIOUS ECET BITS

2008

01. If $\frac{3x+7}{x^2-3x+2}=\frac{K}{x-2}-\frac{10}{x-1}$, then $K=$

1. 13 2. 10 3. 5 4. 0

2009

02. If $\frac{2x-5}{(x-3)^2}=\frac{A}{x-3}+\frac{B}{(x-3)^2}$, then $A+B$ is

1. 1 2. 2 3. 3 4. 4

2010

03. If $\frac{2x+5}{(x+1)^4}=\frac{A}{(x+1)^3}+\frac{B}{(x+1)^4}$ then $(A,B)=$

1. (1,2) 2. (1,3) 3. (2,3) 4. (2,4)

2012

04. If $\frac{1}{x^2+a^2}=\frac{A}{x+ai}+\frac{B}{x-ai}$ then A = ______, B = ______

1) $\frac{1}{2ai},-\frac{1}{2ai}$ 2) $\frac{1}{2ai},\frac{1}{2ai}$ 3) $\frac{1}{ai},-\frac{1}{ai}$ 4) $\frac{1}{ai},\frac{1}{ai}$

05. If $\frac{2x+4}{(x-1)^3}=\frac{A_1}{(x-1)}+\frac{A_2}{(x-1)^2}+\frac{A_3}{(x-1)^3}$ then $\sum_{i=1}^{3}A_i$ is equal to

1) A_2 2) $2A_2$ 3) $4A_2$ 4) $4A_1$

2013

06. If $\frac{15x+18}{(2+x)(1-x)}=\frac{-4}{2+x}+\frac{4}{1-x}$, then the value of A is

1) 5 2) -8 3) 3 4) 11

07. If $\frac{10}{(x-3)(x^2+1)}=\frac{1}{x-3}=\frac{Bx+3}{x^2+1}$, then B =

1) 0 2) 1 3) -1 4) 2

2014

08. If $\frac{x^2+13x+15}{(2x+3)(x+3)^2}=\frac{A}{2x+3}+\frac{B}{x+3}+\frac{C}{(x+3)^2}$ then C =

1) 10 2) 5 3) 3 4) 1

09. If $\frac{2x+1}{(x^2+1)(x-1)}=\frac{Ax+B}{x^2+1}+\frac{C}{x-1}$ then A =

1) -1 2) $\frac{2}{3}$ 3) $-\frac{3}{2}$ 4) $-\frac{2}{3}$

A.P. ECET-2015

10. If $\frac{1-x+6x^2}{x-x^3}=\frac{1}{x}+\frac{3}{1-x}+\frac{A}{1+x}$ then $A=$

1) 4 2) 2 3) -4 4) -2

11. If $\frac{x^3}{(x+2)^2(x^2+2)}=\frac{10}{9(x+2)^2}-\frac{4}{3(x+2)^2}-\frac{Ax+4}{9(x^2+2)}$ then A=

1) 3 2) 1 3) -1 4) -3

T.S. ECET-2015

12. Partial fractions of $\frac{x-1}{(x-2)(x-3)}$ is:

1) $\frac{2}{x-3}+\frac{1}{x-2}$ 2) $\frac{1}{x-3}+\frac{1}{x-2}$

3) $\frac{2}{x-3}+\frac{2}{x-2}$ 4) $\frac{2}{x-3}-\frac{1}{x-2}$

A.P. ECET-2016

13. If $\frac{(x+1)^2}{x^3+x}=\frac{A}{x}+\frac{Bx+C}{x^2+1}$ then $\sin^{-1}\left(\frac{A}{C}\right)=$

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

14. If $\frac{x^2+5}{(x^2+2)^2}=\frac{1}{x^2+2}+\frac{K}{(x^2+2)^2}$ then K=

1) 1 2) 2 3) 3 4) 4

T.S. ECET-2016

15. If $\frac{1-x+6x^2}{x-x^3}=\frac{A}{x}+\frac{B}{1-x}+\frac{C}{1+x}$, then $A=$

1) 0 2) 1 3) 2 4) 3

A.P. ECET-2017

16. If $\frac{3x+2}{(x+1)(2x^2+3)}=\frac{A}{x+1}+\frac{Bx+C}{2x^2+3}$, then A+C -B=

1) 0 2) 2 3) 3 4) 5

17. If $\frac{3x}{(x-a)(x-b)}=\frac{2}{x-a}+\frac{1}{x-b}$ then a:b=

1) -2:1 2) 2:1 3) 1:2 4) 3:1

T.S. ECET-2017

18. $\frac{x^2}{x^2-3x+2}=$

1) $\frac{1}{x-1}+\frac{2}{x-2}$ 2) $1-\frac{1}{1-x}+\frac{3}{x-2}$

3) $1+\frac{1}{1-x}+\frac{4}{x-2}$ 4) $1-\frac{1}{x-1}+\frac{2}{x-2}$

A.P. ECET-2018

19. Resolve into partial fractions $\frac{5}{(2x-1)(3x-1)}=$

1) $\frac{8}{2x-1}+\frac{5}{3x-1}$ 2) $\frac{10}{2x-1}-\frac{15}{3x-1}$

3) $\frac{11}{3x-1}+\frac{7}{2x-1}$ 4) $\frac{1}{2x-1}+\frac{2}{3x-1}$

20. Resolve into partial fractions $\frac{3x-1}{(x-1)(x-2)(x-3)}=$

1) $\frac{2}{x-1}+\frac{5}{x-2}-\frac{4}{x-3}$ 2) $\frac{-1}{x-1}+\frac{5}{x-1}-\frac{4}{x-3}$

3) $\frac{1}{x-1}+\frac{5}{x-2}+\frac{4}{x-3}$ 4) $\frac{1}{x-1}-\frac{5}{x-2}+\frac{4}{x-3}$

T.S. ECET-2018

21. If $\frac{7x-17}{(x-1)(x-3)}=\frac{m}{x-1}+\frac{k}{x-3}$, then m-k-1=

1) 1 2) 2 3) 3 4) -2

PREVIOUS ECET BITS - KEY

01) 1	02) 3	03) 3	04) 2	05) 3
06) 4	07) 2	08) 2	09) 3	10) 3
11) 2	12) 4	13) 1	14) 3	15) 2
16) 2	17) 1	18) 3	19) 2	20) 4
21) 2				

ECET

TRIGONOMETRY

FOR SAIMEDHA STUDENTS ONLY

TRIGONOMETRIC RATIOS

Concepts and Formulae

1 **Trigonometry** is the branch of Mathematics that deals with measurement of triangles and their angles.

2 **Radian:-** A radian is the angle subtended at the centre of a circle by an arc equal in length to the radius of the circle.

3 There are three systems of measurement of angles :
(i) Sexagesimal system (ii) Centesimal system (iii) Circular measure

4 **Sexagesimal system :**
1 right angle = 90^0 (90 degrees) **2.** 1 degree = $60'$ (60 minutes) **3.** 1 minute = $60''$ 60 seconds)

5 **Centesimal system :**
1 right angle = 100 grades (100^g) **2.** 1 grade = 100 minutes ($100'$) **3.** 1 minute = 100 seconds ($100''$)

6. **Circular measure :**
1. Radian$(1^c) = 57^0\ 17'\ 44.8''$ nearly 2. 1 degree $(1^0) = 0.01745^c$

7.

Degrees	0^0	30^0	45^0	60^0	90^0	120^0	135^0	150^0	180^0	210^0	225	240^0	270^0	300^0	315^0	330^0	360^0
Radian	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π

Some standard angles:-

Trig.Ratio	0^0	30^0	45^0	60^0	90^0	180^0	270^0	360^0
Sin θ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
Cos θ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0	1
Tan θ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	n.d	0	n.d	0
Cosec θ	n.d	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	n.d	-1	n.d
Sec θ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	n.d	-1	n.d	1
Cot θ	n.d	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	n.d	0	n.d

Note:- n . d $\rightarrow$ not defined

9. Fundamental relations between the triagonometrical ratios of an angle:

(i) $\sin^2\theta+\cos^2\theta=1$ (ii) $1+\tan^2\theta=\sec^2\theta$ (iii) $1+\cot^2\theta=\mathrm{cosec}^2\theta$

10. $\sec\theta+\tan\theta$ and $\sec\theta-\tan\theta$ are mutual reciprocals

Similarly $\mathrm{cosec}\theta+\cot\theta$ and $\mathrm{cosec}\theta-\cot\theta$ are also mutual reciprocals.

11. $|\sec\theta|\le 1$, $|\mathrm{cosec}\theta|\le 1$, $|\sec\theta|\ge 1$

12.

Trigonometric function	domain	range
sin	R	$[-1,1]$
cos	R	$[-1,1]$
tan	$R-\left\{(2n+1)\frac{\pi}{2};n\in Z\right\}$	R
cosec	$R-\{n\pi;n\in Z\}$	$(-\infty,-1]\cup[1,\infty)$
sec	$R-\left\{(2n+1)\frac{\pi}{2},n\in Z\right\}$	$(-\infty,-1]\cup[1,\infty)$
cot	$R-\{n\pi,n\in Z\}$	R

13. **The signs of Trigonometric functions:-**

II (-, +)
$\sin\theta>0, \mathrm{cosec}\theta>0$
others negative

I (+, +)
All positive

III (-, -)
$\tan\theta>0, \cot\theta>0$
others negative

IV (+, -)
$\cos\theta>0, \sec\theta>0$
others negative

14. When n is a positive integer.

$\sin(n.360^\circ-\theta)=-\sin\theta$; $\sin(n.360^0+\theta)=\sin\theta$; $\cos(n.360^\circ-\theta)=\cos\theta$; $\cos(n.360^0+\theta)=\cos\theta$

15. Trigonometric functions of $2n\pi+\theta$; $n\in Z$

1) $\sin(2n\pi+\theta)=\sin\theta, \cos(2n\pi+\theta)=\cos\theta$ 2) $\tan(2n\pi+\theta)=\tan\theta, \cot(2n\pi+\theta)=\cot\theta$

3) $\sec(2n\pi+\theta)=\sec\theta, \mathrm{cosec}(2n\pi+\theta)=\mathrm{cosec}\theta$

16. $\sin\theta+\sin(\pi+\theta)+\sin(2\pi+\theta)+...+\sin(n\pi+\theta)=0$, if n is odd and

$\sin\theta$ if n is even

17. $\cos\theta+\cos(\pi+\theta)+\cos(2\pi+\theta)+....+\cos(n\pi+\theta)=0$, if n is odd and

$=\cos\theta$ if n is even

PRACTICE SET - I

01. $\cos 225^\circ+\sin 165^\circ=$

1) 0 2) $\frac{\sqrt3-1}{\sqrt3}$ 3) $\frac{\sqrt3-1}{2\sqrt2}$ 4) $\frac{\sqrt2+1}{\sqrt2}$

02. $\log\tan 5^\circ+\log\tan 25^\circ+\log\tan 65^\circ+\log\tan 85^\circ=$

1) $\log\tan 180^\circ$ 2) 1
3) 0 4) -1

03. $\cos 20^\circ+\cos 40^\circ+\cos 140^\circ+\cos 160^\circ=$

1) 0 2) 1 3) -1 4) 2

04. $\log\tan 1^\circ\log\tan 2^\circ\log\tan 3^\circ=...\log\tan 89^\circ=$

1) 1 2) 0 3) $1/2$ 4) none

05. $\sin 24^\circ+\sin 55^\circ-\sin 125^\circ+\sin 204^\circ-\sin 330^\circ=$

1) 1 2) -1 3) 0 4) $1/2$

06. $\cos^2 5^\circ+\cos^2 10^\circ+\cos^2 15^\circ+....+\cos^2 90^\circ=$

1) 7 2) $19/2$ 3) $17/2$ 4) $15/2$

07. $\sin^2 5^\circ+\sin^2 10^\circ+\sin^2 15^\circ+...\sin^2 90^\circ=$

1) $17/2$ 2) $19/2$ 3) $13/2$ 4) $15/2$

08. $\cos 20^\circ+\cos 40^\circ+\cos 60^\circ+....\cos 180^\circ=$

1) 0 2) 1 3) -1 4) none

09. $\tan 20^\circ+\tan 40^\circ+\tan 60^\circ+...+\tan 180^\circ=$

1) 0 2) 1 3) -1 4) none

10. $\cot 195^\circ+\cot 210^\circ+\cot 225^\circ+....+\cot 345^\circ=$

1) 1 2) -1 3) 0 4) none

11. $\cot\frac{\pi}{20}.\cot\frac{3\pi}{20}.\cot\frac{5\pi}{20}.\cot\frac{7\pi}{20}.\cot\frac{2\pi}{20}=$

1) 0 2) 1 3) -1 4) 2

12. $\sin 160^\circ\cos 110^\circ+\sin 250^\circ\cos 340^\circ+\tan 110^\circ\tan 340^\circ=$

1) 1 2) -2 3) 0 4) 2

13. If $5\tan=4$ then $\frac{5\sin\theta-3\cos\theta}{\sin\theta+2\cos\theta}=$

1) $\frac{14}{5}$ 2) $\frac{5}{14}$ 3) $\frac{3}{14}$ 4) none

14. If $\tan\theta=\frac{p}{q}$ then $\frac{p\sin\theta-q\cos\theta}{p\sin\theta+q\cos\theta}=$

1) $\frac{p^2+q^2}{p^2-q^2}$ 2) $\frac{p^2-q^2}{p^2+q^2}$

3) $\frac{q^2-p^2}{p^2+q^2}$ 4) none

15. $(\mathrm{cosec}\theta-\sin\theta)(\sec\theta-\cos\theta)(\tan\theta+\cot\theta)=$

1) -1 2) 1 3) 2 4) $\frac{1}{2}$

16. $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}=$

1) $\frac{1-\sin\theta}{\cos\theta}$ 2) $\frac{1+\sin\theta}{1-\sin\theta}$

3) $\frac{1+\sin\theta}{\cos\theta}$ 4) $\frac{1-\sin\theta}{1+\sin\theta}$

17. $\frac{\mathrm{cosec}A}{\mathrm{cosec}A-1}+\frac{\mathrm{cosec}A}{\mathrm{cosec}A+1}=$

1) $\sec^2 A$ 2) $2\sec^2 A$

3) $\frac{1+\sin\theta}{\cos\theta}$ 4) $\frac{1-\sin\theta}{1+\sin\theta}$

18. $\left(\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}\right)^2=$

1) 1 2) -1

3) $\frac{1+\sin\theta}{\cos\theta}$ 4) $\frac{1+\sin\theta}{1-\sin\theta}$

19. $\frac{\sec\alpha-\sec\beta}{\tan\alpha+\tan\beta}+\frac{\tan\beta-\tan\alpha}{\sec\alpha+\sec\beta}=$

1) 0 2) 1

3) $\sec^2\alpha-\tan^2\beta$ 4) $\sec^2\alpha+\tan^2\beta$

20. $\frac{\sin^3 A+\cos^3 A}{\sin A+\cos A}+\frac{\cos^3 A-\sin^3 A}{\cos A-\sin A}=$
1) 0 2) 1 3) 2 4) -2

21. If $\cos\theta+\sin\theta=\sqrt{2}\cos\theta$ then $\cos\theta-\sin\theta=$
1) $\sqrt{2}\sin\theta$ 2) $-\sqrt{2}\sin\theta$
3) $2\sin\theta$ 4) $-2\sin\theta$

22. If $\cos\theta+\sin\theta=\sqrt{2}\cos\theta$ then $\cos\theta-\sin\theta=$
1) $\sqrt{2}\sin\theta$ 2) $-\sqrt{2}\sin\theta$
3) $2\sin\theta$ 4) $-2\sin\theta$

23. If $\sec\theta-\tan\theta=\frac{a+b}{a-1}$ then $\cos\theta=$
1) $\frac{2a}{a^2-1}$ 2) $\frac{2a}{a^2+1}$ 3) $\frac{a^2-1}{a^2+1}$ 4) $\frac{a^2+1}{a^2-1}$

24. If $\sec\theta+\tan\theta=\frac{a-1}{a+1}$ then $\cos\theta=$
1) $\frac{a^2-1}{a^2+1}$ 2) $\frac{a^2+1}{a^2-1}$ 3) $\frac{1-a^2}{1+a^2}$ 4) $\frac{1+a^2}{1-a^2}$

25. If $\mathrm{cosec}\,\theta+\cot\theta=p$ then $\cos\theta=$
1) $\frac{p^2-1}{p^2+1}$ 2) $\frac{p^2+1}{p^2-1}$ 3) $\frac{1-p^2}{1+p^2}$ 4) $\frac{1+p^2}{1-p^2}$

26. If $\cot\theta\div\mathrm{cosec}\,\theta=5$ then $\cos\theta=$
1) $12/13$ 2) $4/13$ 3) $8/13$ 4) $13/8$

27. If $\cot\theta=\frac{p}{q}$ then $\frac{p\cos\theta+q\sin\theta}{p\cos\theta-q\sin\theta}=$
1) $\frac{p^2-q^2}{p^2+q^2}$ 2) $\frac{p^2+q^2}{p^2-q^2}$
3) $\frac{p^2-q^2}{p^2+q^2}$ 4) none

28. If $\sin\theta+\mathrm{cosec}\,\theta=2$ then $\sin^2\theta+\mathrm{cosec}^2\theta=$
1) 1 2) 2 3) 4 4) -2

29. If $\tan\theta+\sin\theta=m$ and $\tan\theta-\sin\theta=n$ then $m^2-n^2=$
1) $4\sqrt{mm}$ 2) $8\sqrt{mm}$
3) $16\sqrt{mm}$ 4) $4\sqrt{m+n}$

30. $\sin 600^\circ\cos 330^\circ+\cos 120^\circ\sin 150^\circ=$
1) 0 2) 1 3) 2 4) -1

31. If $\cos\theta+\sin\theta=\sqrt{2}\cos\theta$ then $\cos\theta-\sin\theta=$
1) $2\sin\theta$ 2) $\sqrt{2}\sin\theta$
3) $-2\sin\theta$ 4) none

32. If $\tan 20^\circ=\lambda$ then $\frac{\tan 160^\circ-\tan 110^\circ}{1+\tan 160^\circ\tan 110^\circ}=$
1) $\frac{1-\lambda^2}{1+\lambda^2}$ 2) $\frac{1-\lambda^2}{2\lambda}$ 3) $\frac{1+\lambda^2}{1-\lambda^2}$ 4) $\frac{1+\lambda^2}{2\lambda}$

33. If $\tan 35^\circ=k$, then $\frac{\tan 145^\circ-\tan 125^\circ}{1+\tan 145^\circ\tan 125^\circ}=$
1) $\frac{2k}{1-k^2}$ 2) $\frac{2k}{1+k^2}$ 3) $\frac{1-k^2}{2k}$ 4) $\frac{1-k^2}{1+k^2}$

34. If θ lies in the first quadrant and $5\tan\theta=4$, then $\frac{5\sin\theta-3\cos\theta}{\sin\theta-2\cos\theta}=$
1) 5/14 2) 3/14 3) 1/14 4) 0

35. If $\sin x+\sin^2 x=1$ then $\cos^8 x+2\cos^6 x+\cos^4 x=$
1) 0 2) -1 3) 1 4) 2

PRACTICE SET - I KEY

01) 1	02) 3	03) 1	04) 2	05) 4
06) 3	07) 2	08) 3	09) 1	10) 3
11) 2	12) 2	13) 2	14) 2	15) 2
16) 3	17) 2	18) 4	19) 1	20) 1
21) 1	22) 4	23) 1	24) 1	25) 1
26) 2	27) 2	28) 1	29) 4	30) 2
31) 2	32) 3	33) 3	34) 1	35) 3

PUT YOUR FULL EFFORTS
DONT WORRY ABOUT RESULTS
THEY ARE BOUND TO COME TO YOU

PRACTICE SET - II

01. If $\tan 25^\circ=\lambda$, then $\frac{\tan 155^\circ-\tan 115^\circ}{1+\tan 155^\circ\tan 115^\circ}=$
1) $\frac{1-\lambda^2}{2\lambda}$ 2) $\frac{1+\lambda^2}{2\lambda}$ 3) $\frac{1-\lambda^2}{1+\lambda^2}$ 4) $\frac{1+\lambda^2}{1-\lambda^2}$

02. If $\tan\theta=\frac{1}{\sqrt{7}}$ and θ is an acute angle then $\frac{\mathrm{cosec}^2\theta-\sec^2\theta}{\mathrm{cosec}^2\theta+\sec^2\theta}=$
1) 3/4 2) 1/2 3) 2 4) 5/4

03. If $a\cos\theta+b\sin\theta=2$ and $a\sin\theta-b\cos\theta=4$ then
1) $a^2+b^2=6$ 2) $a^2+b^2=12$
3) $a^2+b^2=20$ 4) $a^2-b^2=20$

04. If $\sin\theta=-\frac{5}{13}$ and θ is in third quadrant then $\cot\theta=$
1) $-\frac{13}{12}$ 2) $\frac{12}{5}$ 3) $-\frac{3}{5}$ 4) $\frac{5}{12}$

05. If $\cot\theta=\frac{-24}{7}$ and lies in fourth quadrant then $\sin\theta=$
1) $\frac{7}{25}$ 2) $\frac{25}{7}$ 3) $-\frac{7}{25}$ 4) $\frac{-25}{7}$

06. If $\sin A=\frac{5}{13}$ and A lies in second quadrant, then $\frac{\sec A+\tan A}{\mathrm{cosec}A-\tan A}=$
1) 0.3 2) –0.3 3) 0.5 4) –0.5

07. If A lies in the second quadrant, then $\sqrt{\frac{1+\sin A}{1+\sin A}}-\sqrt{\frac{1+\sin A}{1-\sin A}}=$
1) $\cot\alpha$ 2) $2\cot\alpha$ 3) $\tan\alpha$ 4) $2\tan\alpha$

08. If $\sec\theta=x+\frac{1}{4x}$, then $\sec\theta+\tan\theta=$
1) x 2) 2x 3) 3x 4) 4x

09. If $\tan\theta=-\frac{4}{3}$, then $\sin\theta$ is
1) $-\frac{4}{5}$ but not $\frac{4}{5}$ 2) $-\frac{4}{5}$ or $\frac{4}{5}$
3) $\frac{4}{5}$ but not $-\frac{4}{5}$ 4) none of these

10. If θ lies in the first quadrant and $5\tan\theta=4$, then $\frac{5\sin\theta-3\cos\theta}{\sin\theta+2\cos\theta}=$
1) 5/14 2) 3/14 3) 1/14 4) 0

11. If $5\tan\theta=4$ then $\frac{3\cos\theta+2\sin\theta}{4\cos\theta+3\sin\theta}=$
1) $\frac{21}{31}$ 2) $\frac{31}{21}$ 3) $\frac{23}{32}$ 4) $\frac{32}{23}$

12. The value of $\tan^2 x-\sin^2 x-\tan^2 x.\sin^2 x$ is equal to
1) 1 2) 2 3) –2 4) 0

13. $\frac{\sin^3 A}{1-\cos A}+\frac{\cos^3 A}{1+\sin A}=$
1) $\sin\theta+\cos\theta$ 2) $\sin\theta+\tan\theta$
3) $\tan\theta+\sec\theta$ 4) $\cos\theta+\sec\theta$

14. $\frac{\sec\theta+\tan\theta}{\mathrm{cosec}\theta+\cot\theta}-\frac{\sec\theta-\tan\theta}{\mathrm{cosec}\theta-\cot\theta}=$
1) $\sec\theta-\mathrm{cosec}\theta$ 2) $2(\sec\theta-\mathrm{cosec}\theta)$
3) $2(\sec\theta+\mathrm{cosec}\,\theta)$ 4) $2(\sec\theta-\cot\theta)$

15. If $\tan\theta+\cot\theta=k$, then $\tan^2\theta+\cot^2\theta=$
1) 2k 2) k^2 3) k^2-2 4) k^2+2

16. If $x=a\cos^3\theta, y=b\sin^3\theta$ then by eliminating θ
1) $\left(\frac{x}{a}\right)^{3/2}-\left(\frac{y}{b}\right)^{2/3}=1$ 2) $\left(\frac{x}{a}\right)^{2/3}+\left(\frac{y}{b}\right)^{3/2}=1$
3) $\left(\frac{x}{a}\right)^{2/3}+\left(\frac{y}{b}\right)^{2/3}=1$ 4) $\left(\frac{x}{a}\right)^{2/3}-\left(\frac{y}{b}\right)^{2/3}=1$

17. The eliminant of the equations $x = a\sec^n\theta$, $y = b\tan\theta$ is

1) $\left(\frac{x}{a}\right)^{2/n} - \left(\frac{y}{b}\right)^{2/n} = 1$ 2) $\left(\frac{x}{a}\right)^{2} - \left(\frac{y}{b}\right)^{2} = 1$

3) $\left(\frac{x}{a}\right)^{1/n} - \left(\frac{y}{b}\right)^{1/n} = 1$ 4) $\left(\frac{x}{a}\right)^{2/n} + \left(\frac{y}{b}\right)^{2/n} = 1$

18. The eliminant of the equations $x = \cot\theta + \cos\theta$, $y = \cot\theta - \cos\theta$ is

1) $(x^2 - y^2)^2 = 16xy$ 2) $(x^2 + y^2)^2 = 16xy$

3) $(x^2 - y^2)^2 = 4xy$ 4) $(x^2 + y^2)^2 = 4xy$

19. The eliminant of the equations $\tan\theta + \cot\theta = x$, $\sec\theta - \cos\theta = y$ is

1) $(x^2y)^{1/3} - (xy^2)^{1/3} = 1$

2) $(x^2y)^{1/3} + (xy^2)^{1/3} = 1$

3) $(x^2y)^{2/3} - (xy^2)^{2/3} = 1$

4) $(x^2y)^{2/3} + (xy^2)^{2/3} = 1$

20. $x = a(\sec\theta + \tan\theta)^2, y = b(\sec\theta - \tan\theta)^4 \Rightarrow x^4y^2 =$

1) ab $\sec\theta$ 2) $a^2b^2\tan\theta$

3) a^2b^4 4) a^4b^2

21. $\frac{\sin(-660^\circ)\tan(1050^\circ)\sec(-420^\circ)}{\cos(225^\circ)\operatorname{cosec}(315^\circ)\cos(510^\circ)}$

1) $\frac{\sqrt{3}}{4}$ 2) $\frac{\sqrt{3}}{2}$ 3) $\frac{2}{\sqrt{3}}$ 4) $\frac{4}{\sqrt{3}}$

22. $\left(\frac{\sqrt{3}+2\cos A}{1-2\sin A}\right)^{-3} + \left(\frac{1+2\sin A}{\sqrt{3}-2\cos A}\right)^{-3} =$

1) 1 2) $\sqrt{3}$ 3) 0 4) -1

PRACTICE SET - II KEY

01) 1	02) 1	03) 3	04) 2	05) 3
06) 2	07) 4	08) 2	09) 2	10) 1
11) 3	12) 4	13) 1	14) 2	15) 3
16) 3	17) 1	18) 1	19) 3	20) 4
21) 3	22) 3			

SELF TEST

01. The value of $\cos 10^\circ - \sin 10^\circ$ is

1) >0 2) <0 3) =0 4) None

02. Which of the following is true?

1) $\sin 1^\circ > \sin 1$ 2) since $1^\circ = \sin 1$

3) $\sin 1^\circ < \sin 1$ 4) None

03. If tan 20o = k, then = $\frac{\tan 250^\circ + \tan 340^\circ}{\tan 20^\circ - \tan 11^\circ} =$

1) $\frac{1-k^2}{1+k^2}$ 2) $\frac{1+k^2}{1-k^2}$ 3) $\frac{2k}{1-k^2}$ 4) $\frac{1-k^2}{2k}$

04. If θ lies in the third quadrant and $\sin\theta = \frac{-7}{25}$ the

$\frac{7\cos\theta - 24\tan\theta}{7\cot\theta + 24\tan\theta} =$

1) $\frac{31}{17}$ 2) $\frac{17}{31}$ 3) $\frac{-17}{31}$ 4) $\frac{-31}{17}$

05. $Cos^6\theta + \sin^6\theta =$

1) $1 - 3\sin^2\theta\cos^2\theta$ 2) $1 - 2\sin^2\theta\cos^2\theta$

3) $1 + 3\sin^2\theta\cos^2\theta$ 4) $1 + 2\sin^2\theta\cos^2\theta$

06. $\sin 1^\circ + \sin 2^\circ + \sin 3^\circ + ... + \sin 359^\circ =$

1) 0 2) 1 3) -1 4) 359

07. If $\sin\theta + \sin^2\theta = 1$ then $\cos^2\theta + \cos^4\theta =$

1) 0 2) $\sqrt{2}$ 3) 1 4) 2

08. If $a\cos\theta + b\sin\theta = c$ then $(a\sin\theta - b\cos\theta)^2 =$

1) $c^2 - a^2 - b^2$ 2) $c^2 - a^2 + b^2$

3) $a^2 - b^2 - c^2$ 4) $a^2 + b^2 - c^2$

09. If $x = a(\sec\theta + \tan\theta)^2$, $y = b(\sec\theta - \tan\theta)^2$ then $x^2y^2 =$

1) $ab\sec\theta$ 2) $a^2b^2\tan\theta$ 3) a^2b^4 4) a^2b^2

10. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$ then $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 =$

1) 3 2) 2 3) 1 4) 0

11. If $\sec\theta + \tan\theta = 1/5$ then $\sin\theta =$

1) $\frac{12}{13}$ 2) $-\frac{12}{13}$ 3) $\frac{12}{15}$ 4) $\frac{-12}{15}$

12. $\cos 255^\circ + \sin 165^\circ =$

1) 0 2) $\frac{\sqrt{3}-1}{\sqrt{2}}$ 3 $\frac{\sqrt{3}-1}{2\sqrt{2}}$ 4) $\frac{\sqrt{2}+1}{\sqrt{2}}$

13. If $(\sin\alpha + \operatorname{cosec}\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$, then k =

1) 9 2) 7 3) 5 4) 3

14. If $\tan\theta + \cot\theta = 2$, then $\sin\theta =$

1) $\pm\frac{1}{2}$ 2) $\frac{1}{\sqrt{2}}$ 3) $\frac{1}{3}$ 4) none

15. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$, then $\cos\theta + \sin\theta =$

1) 0 2) $\pm\sqrt{2}\cos\theta$

3) $\pm\sqrt{2}\sin\theta$ 4) none of these

16. If A,B,C,D are the angles of a cyclic quadrilateral, then cos A + cos B + cos C + cos D =

1) 4 2) 1 3) 0 4) -1

17. $\sum_{k=1}^{3}\cos^2\left((2k-1)\frac{\pi}{2}\right) =$

1) 0 2) 1/2 3) -(1/2) 4) 3/2

18. In ΔABC, $\cos\left(\frac{B+2C+3A}{2}\right) + \cos\left(\frac{A-B}{2}\right) =$

1) -1 2) 0 3) 1 4) 2

19. $\cos\theta - 4\sin\theta = 1 \Rightarrow \sin\theta + 4\cos\theta =$

1) ±1 2) 0 3) ±2 4) ±4

20. $\sin 120^\circ \cos 150^\circ - \cos 240^\circ \sin 330^\circ =$

1) 1 2) -1 3) $\frac{2}{3}$ 4) $-\left(\frac{\sqrt{3}+1}{4}\right)$

SELF TEST KEY

01) 1	02) 3	03) 2	04) 2	05) 1
06) 1	07) 3	08) 4	09) 4	10) 1
11) 2	12) 3	13) 2	14) 2	15) 2
16) 3	17) 4	18) 2	19) 4	20) 2

SPACE FOR IMPORTANT NOTES

COMPOUND ANGLES

SYNOPSIS

- $\sin(A+B) = \sin A\cos B + \cos A\sin B$
- $\sin(A-B) = \sin A\cos B - \cos A\sin B$
- $\sin(A+B)+\sin(A-B) = 2\sin A\cos B$
- $\sin(A+B) - \sin(A-B) = 2\cos A\sin B$
- $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B$

  $= \cos^2 B - \cos^2 A$

- $\cos(A+B) = \cos A\cos B - \sin A\sin B$
- $\cos(A-B) = \cos A\cos B + \sin A\sin B$
- $\cos(A+B) + \cos(A-B) = 2\cos A\cos B$
- $\cos(A+B) - \cos(A-B) = -2\sin A\sin B$
- $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B$

  $= \cos^2 B - \sin^2 A$

- $\tan(A+B) = \dfrac{\tan A + \tan B}{1-\tan A\tan B}$ for

  $A, B, A+B \in R-(2n+1)\dfrac{\pi}{2}, n\in Z$

- $\tan(A-B) = \dfrac{\tan A - \tan B}{1+\tan A\tan B}$ for

  $A, B, A-B \in R-(2n+1)\dfrac{\pi}{2}, n\in Z$

- $\tan(A+B)\tan(A-B) = \dfrac{\tan^2 A - \tan^2 B}{1-\tan^2 A\tan^2 B}$
- $\tan(45^0+\theta) = \dfrac{1+\tan\theta}{1-\tan\theta} = \dfrac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}$

  $= \cot(45^0-\theta)$

- $\tan(45^0-\theta) = \dfrac{1-\tan\theta}{1+\tan\theta} = \dfrac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}$

  $= \cot(45^0+\theta)$

- $\cot(A+B) = \dfrac{\cot A\cot B - 1}{\cot B + \cot A}$, for

  $A, B, A+B \in R-n\pi, n\in Z$

- $\cot(A-B) = \dfrac{\cot A\cot B + 1}{\cot B - \cot A}$, for

  $A, B, A-B \in R-n\pi, n\in Z$

- $\cot(A+B)\cot(A-B) = \dfrac{\cot^2 A\cot^2 B - 1}{\cot^2 B - \cot^2 A}$

- $\sin(A+B+C) = \sin A\cos B\cos C + \cos A\sin B\cos C + \cos A\cos B\sin C - \sin A\sin B\sin C$
- $\cos(A+B+C) = \cos A\cos B\cos C - \cos A\sin B\sin C - \sin A\cos B\sin C - \sin A\sin B\cos C$
- $\tan(A+B+C) = \dfrac{\tan A+\tan B+\tan C-\tan A\tan B\tan C}{1-\tan A\tan B-\tan B\tan C-\tan C\tan A}$
- $\cot(A+B+C) = \dfrac{\cot A+\cot B+\cot C-\cot A\cot B\cot C}{1-\cot A\cot B-\cot B\cot C-\cot C\cot A}$
- $\sin 15^0 = \dfrac{\sqrt{3}-1}{2\sqrt{2}} = \cos 75^0$
- $\cos 15^0 = \dfrac{\sqrt{3}+1}{2\sqrt{2}} = \sin 75^0$
- $\tan 15^0 = 2-\sqrt{3} = \cot 75^0$
- $\cot 15^0 = 2+\sqrt{3} = \tan 75^0$
- $\sec 15^0 = \sqrt{6}-\sqrt{2} = \operatorname{cosec} 75^0$
- $\operatorname{cosec} 15^0 = \sqrt{6}+\sqrt{2} = \sec 75^0$
- $\tan A + \tan B + \tan(A+B)\tan A\tan B = \tan(A+B)$

PRACTICE SET - I

01. $\sin 20^0 + \sin 40^0 - \sin 80^0 =$

    1) -1 2) 1 3) 2 4) 0

02. $\sin\alpha - \sin(120^0-\alpha) + \sin(120^0+\alpha) =$

    1) 1/2 2) 1 3) 3/2 4) 0

03. $\cos A + \cos(120^0+A) + \cos(120^0-A) =$

    1) 1 2) -1 3) 0 4) 2

04. $\cos 42^0 + \cos 78^0 + \cos 162^0 =$

    1) 1 2) -1 3) 0 4) 2

05. $\cos 35^0 + \cos 85^0 + \cos 155^0 =$

    1) -1 2) 0 3) 1 4) 1/2

06. $\sin A - \sin(240^0-A) + \sin(240^0+A) =$

    1) 1 2) 2 3) 3 4) 0

07. $\tan 18^0 + \tan 27^0 + \tan 18^0\tan 27^0 =$

    1) -1 2) 0 3) 1 4) 2

08. $\sqrt{3}(\tan 11^0 + \tan 19^0) + \tan 11^0\tan 19^0 =$

    1) 1 2) -1 3) $\sqrt{3}$ 4) $-\sqrt{3}$

09. $\tan 65^0 - \tan 20^0 - \tan 65^0\tan 20^0 =$

    1) -1 2) 1 3) $\sqrt{3}$ 4) $-\sqrt{3}$

10. $\tan 20^0 - \tan 80^0 + \sqrt{3}\tan 20^0\tan 80^0 =$

    1) $\sqrt{3}$ 2) $\dfrac{1}{\sqrt{3}}$ 3) $-\sqrt{3}$ 4) $-\dfrac{1}{\sqrt{3}}$

11. $\tan 4x + \tan 5x - \tan 9x = k\tan 4x\tan 5x\tan 9x$

    $\Rightarrow k =$

    1) 1 2) -1 3) ± 1 4) 2

12. $\tan 8x - \tan 5x - \tan 3x = m\tan 8x\tan 5x\tan 3x$

    $\Rightarrow m =$

    1) 1 2) -1 3) ± 1 4) $-\sqrt{3}$

13. $\tan 25^0 + \tan 35^0 - \sqrt{3} = k\tan 25^0\tan 35^0 \Rightarrow$

    k=

14. $\dfrac{\cos 9^0 + \sin 9^0}{\cos 9^0 - \sin 9^0} = \tan x \Rightarrow x =$

    1) 45° 2) 54° 3) 27° 4) 18°

15. $\dfrac{\cos 15^0 + \sin 15^0}{\cos 15^0 - \sin 15^0} =$

    1) 1 2) $\sqrt{3}$ 3) $\dfrac{1}{\sqrt{3}}$ 4) $2+\sqrt{3}$

16. $0 < \theta < \dfrac{\pi}{2}, \tan\theta = \dfrac{\cos 29^0 + \sin 29^0}{\cos 29^0 - \sin 29^0} \Rightarrow \theta =$

    1) 16^0 2) 74^0 3) 37^0 4) 8^0

17. $\dfrac{\tan 225^0 - \cot 81^0\cot 69^0}{\cot 261^0 + \tan 21^0} =$

    1) 1 2) $1/\sqrt{2}$ 3) $\sqrt{3}$ 4) $1/\sqrt{3}$

18. $\dfrac{\tan 69^0 + \tan 66^0}{1-\tan 69^0\tan 66^0} =$

    1) 1 2) -1 3) $\sqrt{3}$ 4) $-\sqrt{3}$

19. $\dfrac{\tan 40^0 + \tan 20^0}{\cot 45^0 - \cot 50^0\cot 70^0} =$

    1) $\sqrt{3}$ 2) $1/\sqrt{3}$ 3) 1 4) $-1/\sqrt{3}$

20. $\dfrac{\tan 40^0 + \tan 20^0}{\tan 225^0 - \cot 70^0\cot 50^0} =$

    1) $\sqrt{3}$ 2) $1/\sqrt{3}$ 3) 1 4) 0

21. $\dfrac{1-\tan 2^0\cot 62^0}{\tan 152^0 - \cot 88^0} = K\sqrt{3} \Rightarrow K =$

    1) 1 2) -1 3) 1/2 4) -1/2

22. $\tan A = \dfrac{17}{18}, \tan B = \dfrac{1}{35} \Rightarrow \cos(A+B) =$

    1) 1 2) $\sqrt{2}$ 3) -1 4) $1/\sqrt{2}$

23. $\tan(A+B)=m, \tan(A-B)=n \Rightarrow \tan 2A =$

1) $\frac{m+n}{1-mn}$ 2) $\frac{m-n}{1+mn}$

3) $\frac{m+n}{1+mn}$ 4) $\frac{m-n}{1-mn}$

24. $\tan(A+B)=m, \tan(A-B)=n \Rightarrow \cot 2B =$

1) $\frac{m+n}{1-mn}$ 2) $\frac{1+mn}{m-n}$

3) $\frac{1-mn}{m+n}$ 4) $\frac{m-n}{1-mn}$

25. $\tan 75^\circ + \cot 75^\circ =$

1) 1 2) 2 3) 3 4) 4

26. $\sin 105^\circ + \cos 105^\circ =$

1) $1/\sqrt{2}$ 2) $-1/\sqrt{2}$ 3) 0 4) 1

27. $\tan 15^\circ - \cot 15^\circ =$

1) -4 2) $2\sqrt{3}$ 3) 4 4) $-2\sqrt{3}$

28. $\cot 15^\circ + \cot 75^\circ + \cot 135^\circ - \operatorname{cosec} 30^\circ =$

1) 4 2) 3 3) 2 4) 1

29. $\cos^2 45^\circ - \sin^2 15^\circ =$

1) $\frac{\sqrt{3}}{2}$ 2) $\frac{1}{2}$ 3) $\frac{\sqrt{3}}{4}$ 4) $\frac{1}{\sqrt{3}}$

30. $\cos^2 52\frac{1}{2}^\circ - \sin^2 22\frac{1}{2}^\circ =$

1) $\frac{\sqrt{3}+1}{4\sqrt{2}}$ 2) $\frac{\sqrt{3}-1}{4\sqrt{2}}$

3) $\frac{3+\sqrt{3}}{4\sqrt{2}}$ 4) $\frac{3-\sqrt{3}}{4\sqrt{2}}$

31. $\cot\left(\frac{\pi}{4}+\theta\right)\cot\left(\frac{\pi}{4}-\theta\right)=$

1) 0 2) -1 3) 1 4) 1/2

32. $\tan\left(\frac{\pi}{4}+\theta\right)\tan\left(\frac{3\pi}{4}+\theta\right)=$

1) 1 2) -1 3) 2 4) -2

33. $\alpha+\beta=\frac{\pi}{4} \Rightarrow (1+\tan\alpha)(1+\tan\beta)=$

1) 1 2) -1 3) 2 4) -2

34. $(1+\tan 18^\circ)(1+\tan 27^\circ)=$

1) 1 2) -1 3) 2 4) -2

35. $\frac{(1+\tan 13^\circ)(1+\tan 32^\circ)}{(1+\tan 12^\circ)(1+\tan 33^\circ)}=$

1) 1 2) 2 3) 3 4) 4

36. $\frac{(1+\tan 21^\circ)(1+\tan 24^\circ)}{(1+\tan 22^\circ)(1+\tan 23^\circ)}=$

1) 1 2) 2 3) 3 4) 4

37. $\alpha+\beta=\frac{3\pi}{4} \Rightarrow (1-\tan\alpha)(1-\tan\beta)=$

1) 0 2) -1 3) 2 4) 1

38. $A+B=225^\circ \Rightarrow \frac{(1+\cot A)(1+\cot B)}{\cot A \cot B}=$

1) 1 2) 2 3) 3 4) 4

39. $\tan 27^\circ \tan 32^\circ + \tan 32^\circ \tan 31^\circ + \tan 31^\circ \tan 27^\circ =$

1) 1 2) 2 3) 3 4) 4

40. $\cos(x-y)=3\cos(x+y) \Rightarrow \cot x \cot y =$

1) 1 2) 2 3) 3 4) 4

41. $\sin^2\theta+\sin^2(\theta+60^\circ)+\sin^2(\theta-60^\circ)=$

1) 1/2 2) 3/2 3) 1 4) 0

42. $\sin^2 27^\circ+\sin^2 87^\circ+\sin^2 33^\circ=$

1) 1/2 2) 3/2 3) 1 4) 0

43. $\cos^2 20^\circ+\cos^2 40^\circ+\cos^2 80^\circ=$

1) 1/2 2) 3/2 3) 1 4) 0

44. $\sin^2\alpha+\sin^2(120^\circ+\alpha)+\sin^2(120^\circ-\alpha)=$

1) 1/2 2) 3/2 3) 1 4) 0

45. $\cos^2\alpha+\cos^2(120^\circ+\alpha)+\cos^2(120^\circ-\alpha)=$

1) 1/2 2) 3/2 3) 1 4) 0

PRACTICE SET - I KEY

1) 4	2) 4	3) 3	4) 3	5) 2
6) 4	7) 3	8) 1	9) 2	10) 3
11) 2	12) 1	13) 4	14) 2	15) 2
16) 2	17) 3	18) 2	19) 1	20) 1
21) 2	22) 4	23) 1	24) 2	25) 4
26) 1	27) 4	28) 4	29) 3	30) 4
31) 3	32) 1	33) 3	34) 3	35) 1
36) 1	37) 3	38) 2	39) 1	40) 2
41) 2	42) 2	43) 2	44) 2	45) 2

PRACTICE SET - II

01. $\frac{\cos(A-B)}{\cos(A+B)}+\frac{\cos(C+D)}{\cos(C-D)}=0 \Rightarrow$

$\tan A \tan B \tan C \tan D =$

1) 0 2) 1 3) -1 4) 2

02. $\tan(45^\circ+A)+\tan(45^\circ-A)=$

1) 2 cosec 2A 2) 2 sec 2A

3) 2 tan 2A 4) 2 cot 2A

03. $\sec(45^\circ+A)\sec(45^\circ-A)=$

1) sec 2A 2) cos 2A

3) 2 cos 2A 4) 2 sec 2A

04. $\frac{1}{\sin 10^\circ}-\frac{\sqrt{3}}{\cos 10^\circ}=$

1) 4 2) 3 3) 2 4) -1

05. $\sqrt{3}\operatorname{cosec} 20^\circ - \sec 20^\circ =$

1) 2 2) 3 3) 1 4) 4

06. $\tan 50^\circ - 2\tan 10^\circ =$

1) $\tan 50^\circ$ 2. $\cot 50^\circ$ 3) $\tan 10^\circ$ 4) $\cot 10^\circ$

07. $\tan 70^\circ - \tan 20^\circ = k \cot 40^\circ \Rightarrow k =$

1) 1 2) 2 3) -1 4) -2

08. In a Δ ABC, A is obtuse, $\sin A=\frac{3}{5}$, $\sin B=\frac{5}{13}$ then $\sin C=$

1) $\frac{33}{65}$ 2) $\frac{16}{65}$ 3) $\frac{4}{5}$ 4) $\frac{12}{13}$

09. $\sin A=\frac{12}{13}, \cos B=-\frac{3}{5};$

$0<A<\frac{\pi}{2}, \pi<B<\frac{3\pi}{2} \Rightarrow \sin(A+B)=$

1) $\frac{33}{65}$ 2) $-\frac{1}{63}$ 3) $-\frac{56}{65}$ 4) $\frac{63}{65}$

10. $0<A,B<\frac{\pi}{4}, \cos(A+B)=\frac{4}{5},$

$\sin(A-B)=\frac{5}{13} \Rightarrow \tan 2A =$

1) $\frac{16}{63}$ 2) $\frac{56}{33}$ 3) $\frac{1}{65}$ 4) $\frac{45}{77}$

11. $\sin(\theta+\alpha)=\cos(\theta+\alpha) \Rightarrow \tan\theta =$

1) $\frac{1-\tan\alpha}{1+\tan\alpha}$ 2) $\frac{1+\tan\alpha}{1-\tan\alpha}$

3) $\frac{1+\sin\alpha}{1-\sin\alpha}$ 4) $\frac{1+\cos\alpha}{1-\cos\alpha}$

12. $\sum[\sin(A+B).\sin(A-B)]=$

1) 0 2) 1 3) 2 4) 1/2

13. $\sum\left[\frac{\sin(A+B)\sin(A-B)}{\sin^2 A \sin^2 B}\right]=$

1) 0 2) 1 3) 2 4) 1/2

14. $A+B+C=90^0 \Rightarrow \sum \frac{\cos(A+B)}{\cos A \cos B}=$

1) 4 2) 3 3) 2 4) 1

15. $A+B+C=\frac{\pi}{2} \Rightarrow$

$\tan A \tan B+\tan B \tan C+\tan C \tan A=$

1) 1 2) -1 3) 0 4) 2

16. tan (A-B) + tan (B-C) + tan (C-A)=

1) tan A tan B tan C 2) cot A cot B Cot C
3) tan (A-B) tan (B-C) tan (C-A) 4) 0

17. $A+B+C=0^0 \Rightarrow \tan A+\tan B+\tan C=$

1) $\sin A \sin B \sin C$ 2) $\cos A \cos B \cos C$
3) $\tan A \tan B \tan C$ 4) $\cot A \cot B \cot C$

18. A+C = B => tan A tan B tan C =

1) tan A + tan B + tan C
2) tan B - tan C - tan A
3) tan C + tan A - tan B
4) -[tanA+tanB+tanC]

19. $\tan\theta_1 = k\cot\theta_2 \Rightarrow \frac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)}=$

1) $\frac{1+k}{1-k}$ 2) $\frac{1-k}{1+k}$ 3) $\frac{k+1}{k-1}$ 4) $\frac{k-1}{k+1}$

20. $0<\theta<\frac{\pi}{2}, 2\sin\theta=\sqrt{3}\cos10^0+\sin10^0$

$\Rightarrow \theta=$

1) 50° 2) 70° 3) 40° 4) 80°

PRACTICE SET - II KEY

01) 3	02) 2	03) 4	04) 1	05) 4
06) 2	07) 2	08) 2	09) 3	10) 2
11) 1	12) 1	13) 1	14) 3	15) 1
16) 3	17) 3	18) 2	19) 1	20) 2

SELF TEST-I

01. $\cos60^0 \cos30^0+\sin60^0 \sin30^0=$

1) 0 2) 1 3) $1/\sqrt{2}$ 4) $\sqrt{3}/$

02. If $\sin(A+B)=1/\sqrt{2}$ and $\sin B=1/2$, the A =

1) 15^0 2) 60^0 3) 30^0 4) 35^0

03. If $Cos(A-B)=\frac{\sqrt{3}}{2}$ and $CosA=\frac{1}{\sqrt{2}}$, the B =

1) $\pi/6$ 2) $\pi/12$ 3) $\pi/8$ 4) $\pi/4$

04. If $Tan(45^0+B)=2+\sqrt{3}$, then B =

1) 15^0 2) 30^0 3) 45^0 4) 60^0

05. If $Sin(A-B)=\frac{1}{2}$, $Cos(A+B)=\frac{1}{2}$, then (A,B)

1) $30^0, 30^0$ 2) $30^0, 45^0$
3) $15^0, 45^0$ 4) $45^0, 15^0$

06. If $Tan\theta=\frac{Cos9^0+\sin9^0}{Cos9^0-\sin9^0}$ = then θ

1) 36^0 2) 45^0 3) 54^0 4) 69^0

07. If $\cot\theta=\frac{\cos15^0+\sin15^0}{\cos15^0-\sin15^0}$ = then θ

1) 30^0 2) 60^0 3) 64^0 4) 15^0

08. $\sin105^0=$

1) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ 2) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
3) $\frac{\sqrt{3}+1}{\sqrt{2}}$ 4) $\frac{\sqrt{3}-1}{\sqrt{2}}$

09. $\cos105^0=$

1) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ 2) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
3) $\frac{\sqrt{3}+1}{\sqrt{2}}$ 4) $\frac{1-\sqrt{3}}{2\sqrt{2}}$

10. $\tan105^0=$

1) $2-\sqrt{3}$ 2) $-(2+\sqrt{3})$
3) $2+\sqrt{3}$ 4) $\sqrt{3}-2$

11. $\sin15^0+\cos15^0=$

1) $\frac{\sqrt{3}}{2}$ 2) $2\sqrt{3}$ 3) $\sqrt{\frac{3}{2}}$ 4) none

12. $\tan15^0+\tan75^0=$

1) 2 2) $2\sqrt{3}$ 3) 4 4) none

13. $\tan75^0-\cot75^0=$

1) $2\sqrt{3}$ 2) $2+\sqrt{3}$ 3) $2-\sqrt{3}$ 4) none

14. $\tan20^0+\tan25^0+\tan20^0 \tan25^0=$

1) 1 2) $\frac{1}{\sqrt{3}}$ 3) $\sqrt{3}$ 4) none

15. $\tan69^0+\tan66^0-\tan69^0 \tan60^0=$

1) 0 2) -1 3) 1 4) $\sqrt{3}$

16. $\tan75^0-\tan30^0-\tan75^0 \tan30^0=$

1) 1 2) $\sqrt{3}$ 3) $1/\sqrt{3}$ 4) none

17. $\tan57^0-\tan12^0-\tan57^0 \tan12^0=$

1) -1 2) 1 3) 0 4) none

18. $\tan75^0-\tan15^0-\sqrt{3}\tan75^0 \tan15^0=$

1) $\sqrt{3}$ 2) $1/\sqrt{3}$ 3) 1 4) 2

19. $\tan18^0+\tan42^0+\sqrt{3}\tan18^0.\tan42^0=$

1) 0 2) 1 3) $1/\sqrt{3}$ 4) $\sqrt{3}$

20. $\tan20^0+\tan40^0+\sqrt{3}\tan20^0 \tan40^0=$

1) 1 2) $\sqrt{3}$ 3) $1/\sqrt{3}$ 4) none

21. $\frac{1-\tan^2\left(\frac{\pi}{4}+\theta\right)}{1+\tan^2\left(\frac{\pi}{4}+\theta\right)}=$

1) $\cos2\theta$ 2) $\sin2\theta$ 3) $-\sin2\theta$ 4) $-\cos2\theta$

22. $\sin^2 42^0-\cos^2 78^0=$

1) $\frac{\sqrt{5}+1}{8}$ 2) $\frac{\sqrt{5}+1}{4}$
3) $\frac{\sqrt{5}-1}{8}$ 4) $\frac{\sqrt{5}-1}{4}$

23. $\cos^2 45^0-\sin^2 15^0=$

1) $\frac{3}{2}$ 2) $\frac{\sqrt{3}}{2}$ 3) $\frac{\sqrt{3}}{4}$ 4) none

24. $\cos^2 30^0-\sin^2 30^0=$

1) 1 2) 1/2 3) $1/\sqrt{2}$ 4) 1/4

25. The value of $\frac{\tan69^0+\tan66^0}{1-\tan69^0 \tan66^0}=$

1) 1 2) 0 3) 2 4) -1

26. $\Sigma\frac{\sin(A-B)}{\cos A \cos B}=$

1) 0 2) 1 3) 2 4) 3

27. $\frac{\sin3\theta}{\sin\theta}-\frac{\cos3\theta}{\cos\theta}=$

1) 1 2) 2 3) 3 4) none

28. $\dfrac{3\cos\theta+\cos 3\theta}{3\sin\theta-\sin 3\theta}=$

1) $\cot^2\theta+1$ 2) $\cot^4\theta$ 3) $\cot^3\theta$ 4) $2\cot\theta$

29. If θ is acute and $\sin 2\theta=\cos 3\theta$, then $\sin\theta=$

1) $\dfrac{\sqrt{5}+1}{4}$ 2) $\dfrac{\sqrt{5}-1}{4}$

3) $\dfrac{\sqrt{10+2\sqrt{5}}}{4}$ 4) none

30. $\cos^2\dfrac{\pi}{8}+\cos^2\dfrac{3\pi}{8}+\cos^2\dfrac{5\pi}{8}+\cos^2\dfrac{7\pi}{8}=$

1) 0 2) 2 3) 3 4) 4

SELF TEST -1 KEY

01) 4	02) 1	03) 2	04) 2	05) 4
0 6) 3	07) 1	08) 2	09) 4	10) 2
11) 3	12) 3	13) 1	14) 1	15) 2
16) 1	17) 2	18) 1	19) 4	20) 2
21) 3	22) 1	23) 3	24) 2	25) 4
26) 1	27) 2	28) 3	29) 2	30) 2

SELF TEST-II

01. $\dfrac{\tan 80^0-\tan 10^0}{\tan 70^0}=$ 2007

1) 1 2) 1 3) 2 4) 3

02. If $\cos(A-B)=3/5$ and $\tan A\ \tan B=2$, then which one of the following is true?

1) $\sin(A+B)=1/5$ 2) $\sin(A+B)=-1/5$

3) $\cos(A-B)=1/5$ 4) $\cos(A+B)=-1/5$

03. $\operatorname{cosec}15^0+\sec 15^0=$ 2006

1) $2\sqrt{2}$ 2) $\sqrt{6}$ 3) $2\sqrt{6}$ 4) $\sqrt{6}+\sqrt{2}$

04. $\cos\alpha.\sin(\beta-\gamma)+\cos\beta.\sin(\gamma-\alpha)+\cos\gamma.\sin(\alpha-\beta)=$ 2003

1) 0 2) 1/2

3) 1

4) $4\cos\alpha\cos\beta\cos\gamma$

05. $\cos^2\left(\dfrac{\pi}{6}+\theta\right)-\sin^2\left(\dfrac{\pi}{6}-\theta\right)$ 2001

1) $\dfrac{1}{2}\cos 2\theta$ 2) 0 3) $-\dfrac{1}{2}\cos 2\theta$ 4) $\dfrac{1}{2}$

06. $\tan\theta_1=K\cot\theta_2\Rightarrow\dfrac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)}=$ 2000

1) $\dfrac{1+k}{1-k}$ 2) $\dfrac{1-k}{1+k}$ 3) $\dfrac{k+1}{k-1}$ 4) $\dfrac{k-1}{k+1}$

07. $\tan 5x-\tan 3x-\tan 2x=$ 1991

1) $\tan 5x\tan 3x\tan 2x$ 2) $\sin 5x\sin 3x\sin 2x$

3) $\cos 5x\cos 3x\cos 2x$ 4) None

08. $\tan 15^0+\tan 75^0=$ 1987

1) 1 2) 2 3) 3 4) 4

09. If A + C = B then tan A. tan B. tan C = 1986

1) tan A + tan B + tan C 2) tan A - tan C - tan C

3) tan A + tan B - tan C

4) - (tan A + tan B + tan C)

SELF TEST - II

01) 3	02) 4	03) 3	04) 1	05) 1
06) 1	07) 4	8) 4	09) 2	

Araise ! Awake ! And stop not till the goal is reached

MULTIPLE AND SUB-MULTIPLE ANGLES

SYNOPSIS

- $\sin 2A=2\sin A\cos A=\dfrac{2\tan A}{1+\tan^2 A}=\dfrac{2\cot A}{1+\cot^2 A}$
- $\sin A=2\sin\dfrac{A}{2}\cos\dfrac{A}{2}=\dfrac{2\tan\frac{A}{2}}{1+\tan^2\frac{A}{2}}=\dfrac{2\cot\frac{A}{2}}{1+\cot^2\frac{A}{2}}$
- $\cos 2A=\cos^2 A-\sin^2 A=2\cos^2 A-1=1-2\sin^2 A=\dfrac{1-\tan^2 A}{1+\tan^2 A}=\dfrac{\cot^2 A-1}{\cot^2 A+1}$
- $\cos A=\cos^2\dfrac{A}{2}-\sin^2\dfrac{A}{2}=2\cos^2\dfrac{A}{2}-1=1-2\sin^2\dfrac{A}{2}$

$=\dfrac{1-\tan^2\frac{A}{2}}{1+\tan^2\frac{A}{2}}=\dfrac{\cot^2\frac{A}{2}-1}{\cot^2\frac{A}{2}+1}$

- $\sqrt{1+\sin 2A}=\pm(\cos A+\sin A)$

$\Rightarrow\cos A+\sin A=\pm\sqrt{1+\sin 2A}$

- $\sqrt{1-\sin 2A}=\pm(\cos A-\sin A)$

$\Rightarrow\cos A-\sin A=\pm\sqrt{1-\sin 2A}$

- $\sqrt{1+\sin A}=\pm\left(\cos\dfrac{A}{2}+\sin\dfrac{A}{2}\right)$

$\Rightarrow\cos\dfrac{A}{2}+\sin\dfrac{A}{2}=\pm\sqrt{1+\sin A}$

- $\sqrt{1-\sin A}=\pm\left(\cos\dfrac{A}{2}-\sin\dfrac{A}{2}\right)$

$\Rightarrow\cos\dfrac{A}{2}-\sin\dfrac{A}{2}=\pm\sqrt{1-\sin A}$

- $\sqrt{\dfrac{1+\cos 2A}{2}}=\pm\cos A$

$\Rightarrow\cos A=\pm\sqrt{\dfrac{1+\cos 2A}{2}}$

- $\sqrt{\dfrac{1+\cos A}{2}}=\pm\cos\dfrac{A}{2}$

$\Rightarrow\cos\dfrac{A}{2}=\pm\sqrt{\dfrac{1+\cos A}{2}}$

- $\sqrt{\dfrac{1-\cos 2A}{2}}=\pm\sin A$

$\Rightarrow\sin A=\pm\sqrt{\dfrac{1-\cos 2A}{2}}$

- $\sqrt{\dfrac{1-\cos A}{2}}=\pm\sin\dfrac{A}{2}$

$\Rightarrow\sin\dfrac{A}{2}=\pm\sqrt{\dfrac{1-\cos A}{2}}$

- $\tan\left(\dfrac{\pi}{4}+\dfrac{A}{2}\right)=\dfrac{1+\tan\frac{A}{2}}{1-\tan\frac{A}{2}}=\dfrac{\cot\frac{A}{2}+1}{\cot\frac{A}{2}-1}$

$=\dfrac{\cos\frac{A}{2}+\sin\frac{A}{2}}{\cos\frac{A}{2}-\sin\frac{A}{2}}=\sqrt{\dfrac{1+\sin A}{1-\sin A}}$

$=\sqrt{\dfrac{\operatorname{cosec}A+1}{\operatorname{cosec}A-1}}=\dfrac{1+\sin A}{\cos A}=\dfrac{\cos A}{1-\sin A}$

$$= \frac{\operatorname{cosec} A+1}{\cot A} = \frac{\cot A}{\operatorname{cosec} A-1}$$

$$= \sec A + \tan A = \cot\left(\frac{\pi}{4} - \frac{A}{2}\right)$$

➔ $$\tan\left(\frac{\pi}{4} - \frac{A}{2}\right) = \frac{1-\tan\frac{A}{2}}{1+\tan\frac{A}{2}} = \frac{\cot\frac{A}{2}-1}{\cot\frac{A}{2}+1}$$

$$= \frac{\cos\frac{A}{2} - \sin\frac{A}{2}}{\cos\frac{A}{2} + \sin\frac{A}{2}} = \sqrt{\frac{1-\sin A}{1+\sin A}}$$

$$= \sqrt{\frac{\operatorname{cosec} A-1}{\operatorname{cosec} A+1}} = \frac{1-\sin A}{\cos A} = \frac{\cos A}{1+\sin A}$$

$$= \frac{\operatorname{cosec} A-1}{\cot A} = \frac{\cot A}{\operatorname{cosec} A+1}$$

$$= \sec A - \tan A = \cot\left(\frac{\pi}{4} + \frac{A}{2}\right)$$

➔ $$\tan\frac{A}{2} = \operatorname{cosec} A - \cot A = \frac{1-\cos A}{\sin A}$$

$$= \frac{\sin A}{1+\cos A} = \sqrt{\frac{1-\cos A}{1+\cos A}} = \sqrt{\frac{\sec A-1}{\sec A+1}}$$

$$= \frac{\sec A-1}{\tan A} = \frac{\tan A}{\sec A+1}$$

➔ $$\cot\frac{A}{2} = \operatorname{cosec} A + \cot A = \frac{1+\cos A}{\sin A}$$

$$= \frac{\sin A}{1-\cos A} = \sqrt{\frac{1+\cos A}{1-\cos A}} = \sqrt{\frac{\sec A+1}{\sec A-1}}$$

$$= \frac{\sec A+1}{\tan A} = \frac{\tan A}{\sec A-1}$$

➔ ◆ $$\tan 2A = \frac{2\tan A}{1-\tan^2 A} = \frac{2\cot A}{\cot^2 A-1}$$

◆ $$\tan A = \frac{2\tan\frac{A}{2}}{1-\tan^2\frac{A}{2}} = \frac{2\cot\frac{A}{2}}{\cot^2\frac{A}{2}-1}$$

$$= \sqrt{\frac{1-\cos 2A}{1+\cos 2A}} = \sqrt{\frac{\sec 2A-1}{\sec 2A+1}} = \frac{\sec 2A-1}{\tan 2A}$$

$$= \frac{\tan 2A}{\sec 2A+1} = \frac{1-\cos 2A}{\sin 2A}$$

$$= \operatorname{cosec} 2A - \cot 2A = \frac{\sin 2A}{1+\cos 2A}$$

◆ $$\cot 2A = \frac{\cot^2 A-1}{2\cot A}$$

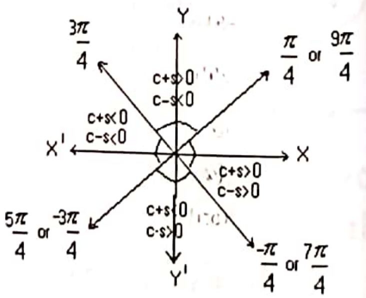
◆ $$\cot A = \frac{\cot^2\frac{A}{2}-1}{2\cot\frac{A}{2}} = \sqrt{\frac{1+\cos 2A}{1-\cos 2A}} = \sqrt{\frac{\sec 2A+1}{\sec 2A-1}}$$

$$= \frac{\sec 2A+1}{\tan 2A} = \frac{\tan 2A}{\sec 2A-1} = \frac{1+\cos 2A}{\sin 2A}$$

$$= \frac{\sin 2A}{1-\cos 2A} = \operatorname{cosec} 2A + \cot 2A$$

➔ $$\frac{\tan A+\tan B}{\tan A-\tan B} = \frac{\sin(A+B)}{\sin(A-B)}$$

➔ $C = \cos\frac{A}{2}$; $S = \sin\frac{A}{2}$



$c+s>0$ in $\left(-\frac{\pi}{4}, \frac{3\pi}{4}\right)$

$c+s<0$ in $\left(\frac{3\pi}{4}, \frac{7\pi}{4}\right)$

$c-s>0$ in $\left(-\frac{3\pi}{4}, \frac{\pi}{4}\right)$

$c-s<0$ in $\left(\frac{\pi}{4}, \frac{5\pi}{4}\right)$

➔ ◆ cot A + tan A = 2 cosec 2A
◆ cot A - tan A = 2 cot 2A

➔ $\tan A + 2\tan 2A + \dots\dots + 2^{n-1}\tan 2^{n-1}A + 2^n\cot 2^n A = \cot A$ (or)
$\cot A - \tan A - 2\tan 2A \dots\dots - 2^{n-1}\tan 2^{n-1}A = 2^n \cot 2^n A$

➔ ◆ $\sin 3A = 3\sin A - 4\sin^3 A$
◆ $\cos 3A = 4\cos^3 A - 3\cos A$

◆ $$\tan 3A = \frac{3\tan A - \tan^3 A}{1-3\tan^2 A},$$

$A, 3A \neq (2n+1)\frac{\pi}{2}, n \in N$

◆ $$\cot 3A = \frac{3\cot A - \cot^3 A}{1-3\cot^2 A},$$

$A, 3A \neq n\pi, n \in N$

➔ $\sin\theta.\sin(\alpha-\theta).\sin(\alpha+\theta) = \frac{1}{4}\sin 3\theta$ where
$\alpha =$ 60° (or) 120° (or) 240° (or) 300°

➔ $\cos\theta.\cos(\alpha-\theta).\cos(\alpha+\theta) = \frac{1}{4}\cos 3\theta$ where
$\alpha =$ 60°(or) 120° (or) 240° (or) 300°

➔ $$\left.\begin{array}{l}\sin^2\theta + \sin^2(\alpha-\theta) + \sin^2(\alpha+\theta) \\ \cos^2\theta + \cos^2(\alpha-\theta) + \cos^2(\alpha+\theta)\end{array}\right\} = \frac{3}{2}$$
where $\alpha =$ 60°(or)120°(or)240°(or) 300°

➔ $$\left.\begin{array}{l}\sin^3\theta + \sin^3(60^\circ-\theta) - \sin^3(60^\circ+\theta) \\ \sin^3\theta - \sin^3(120^\circ-\theta) + \sin^3(120^\circ+\theta) \\ \sin^3\theta - \sin^3(240^\circ-\theta) + \sin^3(240^\circ+\theta) \\ \sin^3\theta + \sin^3(300^\circ-\theta) - \sin^3(300^\circ+\theta)\end{array}\right\}$$

$$= -\frac{3}{4}\sin 3\theta$$

➔ $$\left.\begin{array}{l}\cos^3\theta - \cos^3(60^\circ-\theta) - \cos^3(60^\circ+\theta) \\ \cos^3\theta + \cos^3(120^\circ-\theta) + \cos^3(120^\circ+\theta) \\ \cos^3\theta + \cos^3(240^\circ-\theta) + \cos^3(240^\circ+\theta) \\ \cos^3\theta - \cos^3(300^\circ-\theta) - \cos^3(300^\circ+\theta)\end{array}\right\}$$

$$= \frac{3}{4}\cos 3\theta$$

➔ $$\left.\begin{array}{l}\sin^3\theta - \sin^3(60^\circ+\theta) + \sin^3(120^\circ+\theta) \\ \sin^3\theta + \sin^3(120^\circ+\theta) + \sin^3(240^\circ+\theta) \\ \sin^3\theta + \sin^3(240^\circ+\theta) - \sin^3(300^\circ+\theta) \\ \sin^3\theta - \sin^3(60^\circ+\theta) - \sin^3(300^\circ+\theta)\end{array}\right\}$$

$$= -\frac{3}{4}\sin 3\theta$$

➔ $$\left.\begin{array}{l}\cos^3\theta - \cos^3(60^\circ+\theta) + \cos^3(120^\circ+\theta) \\ \cos^3\theta + \cos^3(120^\circ+\theta) + \cos^3(240^\circ+\theta) \\ \cos^3\theta + \cos^3(240^\circ-\theta) - \cos^3(300^\circ+\theta) \\ \cos^3\theta - \cos^3(60^\circ+\theta) - \cos^3(300^\circ+\theta)\end{array}\right\} = \frac{3}{4}\cos 3\theta$$

➔ $\tan\theta.\tan(\alpha-\theta).\tan(\alpha+\theta) = \tan 3\theta$ where
$\alpha =$ 60° (or) 120° (or) 240° (or) 300°

➔ $\cot\theta.\cot(\alpha-\theta).\cot(\alpha+\theta) = \cot 3\theta$ where
$\alpha =$ 60° (or) 120° (or) 240° (or) 300°

➔ ◆ $\tan\theta + \tan(\theta-\alpha) + \tan(\theta+\alpha) = 3\tan\theta$
where
$\alpha =$ 60° (or) 120° (or) 240° (or) 300°

ii) $\left.\begin{array}{l}\tan\theta+\tan(60^0+\theta)+\tan(120^0+\theta)\\ \tan\theta+\tan(120^0+\theta)+\tan(240^0+\theta)\\ \tan\theta+\tan(240^0+\theta)+\tan(300^0+\theta)\\ \tan\theta+\tan(60^0+\theta)+\tan(300^0+\theta)\end{array}\right\}$

$= 3\tan 3\theta$

➔ $\cot\theta+\cot(\theta-\alpha)+\cot(\theta+\alpha)=3\cot\theta$

where

$\alpha = 60^0$ (or) 120^0 (or) 240^0 (or) 300^0

➔ $\left.\begin{array}{l}\cot\theta+\cot(60^0+\theta)+\cot(120^0+\theta)\\ \cot\theta+\cot(120^0+\theta)+\cot(240^0+\theta)\\ \cot\theta+\cot(240^0+\theta)+\cot(300^0+\theta)\\ \cot\theta+\cot(60^0+\theta)+\cot(300^0+\theta)\end{array}\right\} = 3\cot 3\theta$

➔ α, β are the solutions of $a\cos\theta+b\sin\theta=c \Rightarrow$

- $\tan\left(\frac{\alpha+\beta}{2}\right)=\frac{b}{a}$
- $\sin(\alpha+\beta)=\frac{2ab}{a^2+b^2}$
- $\cos(\alpha+\beta)=\frac{a^2-b^2}{a^2+b^2}$
- $\tan(\alpha+\beta)=\frac{2ab}{a^2-b^2}$
- $\sin\alpha+\sin\beta=\frac{2bc}{a^2+b^2}$
- $\sin\alpha.\sin\beta=\frac{c^2-a^2}{a^2+b^2}$
- $\cos\alpha+\cos\beta=\frac{2ca}{a^2+b^2}$
- $\cos\alpha\ \cos\beta=\frac{c^2-b^2}{a^2+b^2}$
- $\tan\alpha+\tan\beta=\frac{2ab}{c^2-b^2}$
- $\tan\alpha\ \tan\beta=\frac{c^2-a^2}{c^2-b^2}$
- $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}=\frac{2b}{c+a}$
- $\tan\frac{\alpha}{2}.\tan\frac{\beta}{2}=\frac{c-a}{c+a}$
- $\cot\frac{\alpha}{2}+\cot\frac{\beta}{2}=\frac{2b}{c-a}$

➔ If n is odd, $n\neq 1$, then the sides $n, \frac{n^2-1}{2}, \frac{n^2+1}{2}$

If n is even, $n\neq 2$, then the sides $n, \frac{n^2}{4}-1, \frac{n^2}{4}+1$ form right angled triangles

➔ $\frac{a}{b}=\frac{c}{d}\Rightarrow\frac{a+b}{a-b}=\frac{c+d}{c-d}$

➔ $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}\Rightarrow\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=\frac{a+c+e}{b+d+f}$

$=\frac{a+c}{b+d}=\frac{c+e}{d+f}=\frac{a+e}{b+f}=\frac{a-c}{b-d}=\frac{c-e}{d-f}$

$=\frac{a-e}{b-f}$

➔ • $\sin 22\frac{1}{2}^0=\sqrt{\frac{\sqrt{2}-1}{2\sqrt{2}}}=\frac{1}{2}\sqrt{2-\sqrt{2}}=\cos 67\frac{1}{2}^0$

- $\cos 22\frac{1}{2}^0=\sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}=\frac{1}{2}\sqrt{2+\sqrt{2}}=\sin 67\frac{1}{2}^0$
- $\tan 22\frac{1}{2}^0=\sqrt{2}-1=\cot 67\frac{1}{2}^0$
- $\cot 22\frac{1}{2}^0=\sqrt{2}+1=\tan 67\frac{1}{2}^0$

➔ • $\sin 18^0=\frac{\sqrt{5}-1}{4}=\cos 72^0$

- $\cos 36^0=\frac{\sqrt{5}+1}{4}=\sin 54^0$
- $\cos 18^0=\frac{\sqrt{10+2\sqrt{5}}}{4}=\sin 72^0$
- $\sin 36^0=\frac{\sqrt{10-2\sqrt{5}}}{4}=\cos 54^0$

➔ • $\sin 7\frac{1}{2}^0=\sqrt{\frac{2\sqrt{2}-\sqrt{3}-1}{4\sqrt{2}}}=\frac{\sqrt{4-\sqrt{6}-\sqrt{2}}}{2\sqrt{2}}$

$=\cos 82\frac{1}{2}^0$

- $\cos 7\frac{1}{2}^0=\sqrt{\frac{2\sqrt{2}+\sqrt{3}+1}{4\sqrt{2}}}=\frac{\sqrt{4+\sqrt{6}+\sqrt{2}}}{2\sqrt{2}}$

$=\sin 82\frac{1}{2}^0$

- $\tan 7\frac{1}{2}^0=(\sqrt{3}-\sqrt{2})(\sqrt{2}-1)=\cot 82\frac{1}{2}^0$
- $\tan 37\frac{1}{2}^0=(\sqrt{3}-\sqrt{2})(\sqrt{2}+1)=\cot 57\frac{1}{2}^0$
- $\tan 52\frac{1}{2}^0=(\sqrt{3}+\sqrt{2})(\sqrt{2}-1)=\cot 37\frac{1}{2}^0$
- $\tan 82\frac{1}{2}^0=(\sqrt{3}+\sqrt{2})(\sqrt{2}+1)=\cot 7\frac{1}{2}^0$

➔ • $\tan 18^0=\sqrt{4\sqrt{5}-8}$ ii) $\tan 36^0=\sqrt{5-2\sqrt{5}}$

PRACTICE SET - I

01. $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}=$

1) $\tan\frac{\theta}{2}$ 2) $\cot\frac{\theta}{2}$ 3) $\sec\frac{\theta}{2}$ 4) $\operatorname{cosec}\frac{\theta}{2}$

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

1) $\tan\frac{\theta}{2}$ 2) $\cot\frac{\theta}{2}$ 3) $\tan\theta$ 4) $\cot\theta$

03. $\frac{\cos A-\cos 3A}{\cos A}+\frac{\sin A+\sin 3A}{\sin A}=$

1) 1 2) 2 3) 3 4) 4

04. $\cos^3 A\sin 3A+\sin^3 A\cos 3A=k\sin 4A\Rightarrow k=$

1) $\frac{1}{4}$ 2) $\frac{3}{4}$ 3) $\frac{1}{2}$ 4) $\frac{5}{2}$

05. $\cos^6 A+\sin^6 A=1-k\sin^2(2A)\Rightarrow k=$

1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) $\frac{3}{4}$ 4) 1

06. $\frac{1}{\tan 3A-\tan A}-\frac{1}{\cot 3A-\cot A}=k\cot 2A\Rightarrow k=$

1) 4 2) 3 3) 2 4) 1

07. $\tan A=\frac{1-\cos B}{\sin B}\Rightarrow\tan 2A-\tan B=$

1) 0 2) 1 3) 1/2 4) 1/4

08. $\cos^3 10^0+\cos^3 110^0+\cos^3 130^0=$

1) $\frac{3}{4}$ 2) $\frac{3}{8}$ 3) $\frac{3\sqrt{3}}{8}$ 4) $\frac{3\sqrt{3}}{4}$

09. $\cos^2 10^0 + \cos^2 50^0 + \cos^2 70^0 =$

1) $\frac{1}{2}$ 2) 1 3) $\frac{3}{2}$ 4) 2

10. $\sin^2 160^0 + \sin^2 140^0 + \sin^2 100^0 =$

1) $\frac{1}{2}$ 2) $\frac{3}{2}$ 3) $\frac{5}{2}$ 4) $\frac{7}{2}$

11. $x^2+y^2=1 \Rightarrow (3x-4x^3)^2+(3y-4y^3)^2=$

1) 1 2) 2
3) 3 4) 4

12. $\frac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}=$

$\tan x \Rightarrow x=$

1) 4A 2) 3A 3) 2A 4) A

13. $x=\cos A+\cos 2A+\cos 3A$

$y=\sin A+\sin 2A+\sin 3A \Rightarrow \frac{x}{y}=$

1) cot A 2) cot 2A
3) cot 3A 4) cot 4A

14. $x=\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \Rightarrow \frac{2x}{1-x^2}=$

1) $\sin\theta$ 2) $\cos\theta$ 3) $\tan\theta$ 4) $\cot\theta$

15. $\frac{\cos^3 21^0+\cos^3 39^0}{\cos 21^0+\cos 39^0}=$

1) $\frac{3}{2}$ 2) $\frac{2}{3}$ 3) $\frac{3}{4}$ 4) $\frac{4}{3}$

16. $\tan(45^0+A)+\tan(45^0-A)=$

1) 2 cosec 2A 2) 2 sec 2A
3) 2 tan 2A 4) 2 cot 2A

17. $\sec(45^0+A)\sec(45^0-A)=$

1) sec 2A 2) cos 2A
3) 2 cos 2A 4) 2 sec 2A

18. $\frac{\cos A+\sin A}{\cos A-\sin A}-\frac{\cos A-\sin A}{\cos A+\sin A}=$

1) 2 tan 2A 2) 2 cosec 2A
3) 2 cot 2A 4) 2 sec 2A

19. $\frac{\sin 12A}{\sin 4A}-\frac{\cos 12A}{\cos 4A}=$

1) 6 2) 4 3) 2 4) 1

20. $\frac{3\cos\theta+\cos 3\theta}{3\sin\theta-\sin 3\theta}=$

1) $\operatorname{cosec}^2\theta$ 2) $\cot^4\theta$
3) $\cot^3\theta$ 4) $2\cot\theta$

21. $\frac{\cos^3 40^0+\cos^3 20^0}{\cos 40^0+\cos 20^0}=$

1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) $\frac{3}{4}$ 4) 1

22. $4\cos^3 15^0 - 3\cos 15^0 =$

1) $\frac{1}{2}$ 2) $\frac{1}{\sqrt{2}}$ 3) $\frac{1}{\sqrt{3}}$ 4) $\sqrt{3}$

23. $\cos^2 72^0 - \sin^2 54^0 =$

1) $\frac{\sqrt{5}}{2}$ 2) $\frac{-\sqrt{3}}{4}$ 3) $\frac{-\sqrt{5}}{4}$ 4) $\frac{\sqrt{5}}{8}$

24. $\sec 72^0 - \sec 36^0 =$

1) 2 2) $\frac{1}{2}$ 3) 4 4) $\frac{1}{4}$

25. $\cos^2\frac{\pi}{12}+\cos^2\frac{\pi}{4}+\cos^2\frac{5\pi}{12}=$

1) 1 2) $\frac{1}{2}$ 3) $\frac{3}{2}$ 4) $\frac{1}{4}$

26. If $\tan\beta = 2\sin\alpha\sin\gamma\operatorname{cosec}(\alpha+\gamma)$, then $\cot\alpha, \cot\beta, \cot\gamma$ are in

1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

27. If $180^0<\theta<270^0, \cot\theta=\frac{4}{3}$, then $\sin\frac{\theta}{2}=$

1) $\frac{3}{\sqrt{10}}$ 2) $-\frac{2}{\sqrt{5}}$ 3) $-\frac{1}{\sqrt{5}}$ 4) $\frac{1}{\sqrt{5}}$

28. If $90^0<\theta<180^0, \sin\theta=\frac{3}{5}$, then $\sin 3\theta=$

1) $\frac{117}{125}$ 2) $\frac{-117}{125}$
3) $\frac{-125}{117}$ 4) $\frac{125}{117}$

29. If $90^0<\theta<180^0, \cos\theta=-\frac{12}{13}$, then $\sin 2\theta=$

1) $\frac{120}{169}$ 2) $\frac{-120}{169}$
3) $\frac{169}{120}$ 4) $\frac{-169}{120}$

PRACTICE SET - I KEY

01) 1	02) 3	03) 4	04) 2	05) 3
06) 4	07) 1	08) 3	09) 3	10) 2
11) 1	12) 1	13) 2	14) 3	15) 3
16) 2	17) 4	18) 1	19) 3	20) 3
21) 3	22) 2	23) 3	24) 1	25) 3
26) 1	27) 1	28) 1	29) 2	

PRACTICE SET - II

01. $\tan 9^0 - \tan 27^0 - \tan 63^0 + \tan 81^0 =$

1) 0 2) 2 3) 1 4) 4

02. $\cos 12^0 \cos 24^0 \cos 48^0 \cos 84^0 =$

1) $\frac{1}{8}$ 2) $\frac{1}{16}$ 3) $\frac{-1}{16}$ 4) $\frac{-1}{8}$

03. $\cos\frac{\pi}{11}\cos\frac{2\pi}{11}\cos\frac{3\pi}{11}\cos\frac{4\pi}{11}\cos\frac{5\pi}{11}=$

1) $\frac{1}{4}$ 2) $\frac{1}{8}$ 3) $\frac{1}{8}$ 4) $\frac{1}{16}$

04. $\cos\frac{\pi}{7}\cos\frac{2\pi}{7}\cos\frac{4\pi}{7}=$

1) $\frac{1}{8}$ 2) $\frac{-1}{8}$ 3) $\frac{1}{4}$ 4) $\frac{-1}{4}$

05. $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)=$

1) $\frac{-1}{8}$ 2) $\frac{1}{8}$ 3) $\frac{3}{2}$ 4) $\frac{3}{4}$

06. $\sqrt{3}\operatorname{cosec} 20^0 - \sec 20^0 =$

1) 2 2) 3 3) 1 4) 4

PRACTICE SET - II KEY

1) 4 2) 2 3) 4 4) 2 5) 2 6) 4

SELF TEST

01. $\frac{\sin 2A}{1+\cos 2A}=$

1) $\sin A$ 2) $\cos A$
3) $\cot A$ 4) $\tan A$

02. $\frac{\cos 2A}{1-\sin 2A}=$

1) $\tan\left(\frac{\pi}{4}-A\right)$ 2) $\cot\left(\frac{\pi}{4}-A\right)$
3) $\cot A$ 4) $\tan A$

03. $\frac{1+\cos\theta+\sin\theta}{1-\cos\theta+\sin\theta}=.....$

1) $\sin\theta/2$ 2) $\cos\theta/2$
3) $\tan\theta/2$ 4) $\cot\theta/2$

04. $\frac{\sin A}{1-\cos A}-\frac{1-\cos A}{\sin A}=$

1) $2\tan A$ 2) $2\cot A$
3) $2\cot A/2$ 4) $2\tan A/2$

05. $\frac{1-\cos 2A}{\sin 2A}=$

1) $\tan\theta$ 2) $\cot\theta$ 3) $\sin\theta$ 4) $\cos\theta$

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

1) 1 2) 2 3) 3 4) none

07. $\frac{\sin^3 A+\sin 3A}{\sin A}+\frac{\cos^3 A-\cos 3A}{\cos A}$

1) 1 2) 2 3) 3 4) $\sqrt{3}$

8. $\tan\left(\frac{\pi}{4}+A\right)+\tan\left(\frac{\pi}{4}-A\right)=$

1) $2\sec 2A$ 2) $2\operatorname{cosec} 2A$
3) $2\tan 2A$ 4) $2\cot 2A$

9. If $180^0<\theta<270^0, \cos\theta=\frac{-3}{5}$, then

$\tan\frac{\theta}{2}=$

1) 2 2) 1 3) -1 4) -2

10. If $\cos\theta=\frac{7}{25}$, $270<\theta<360^0$ then

$\cot A/2=$
1) 3/4 2) -3/4
3) 4/3 4) -4/3

11. If $180^0<\theta<270^0, \cot\theta=4/3$. Then

$\sin\theta/2=$

1) $\frac{3}{\sqrt{10}}$ 2) $\frac{2}{\sqrt{5}}$ 3) $\frac{-1}{\sqrt{5}}$ 4) $\frac{1}{\sqrt{5}}$

12. If $x+\frac{1}{x}=2\cos\theta$, then $x^3+\frac{1}{x^3}=$

1) $\cos 3\theta$ 2) $\sin 3\theta$
3) $2\cos 3\theta$ 4) $2\sin 3\theta$

13. If $\tan A=1/7$, $\tan B=1/3$ then $\cos 2A=$

1) $\sin B$ 2) $\sin 2B$
3) $\sin 4B$ 4) $\cos B$

14. A quadratic equation whose roots are

$\sin 18^0$, and $\cos 36^0$ is

1) $x^2-\sqrt{5}x+1=0$ 2) $2x^2-\sqrt{5}x+1=0$
3) $4x^2+2\sqrt{5}x+1=0$
4) $4x^2-2\sqrt{5}x+1=0$

15. A quadratic equation whose roots are

$\tan 22\frac{1}{2}^0$ and $\cot 22\frac{1}{2}^0$ is

1) $x^2-2\sqrt{2}x+1=0$
2) $2x^2-\sqrt{2}x+1=0$
3) $x^2+2\sqrt{2}x+1=0$
4) $x^2-2\sqrt{2}x-1=0$

16. $\frac{1}{\sin 10^0}-\frac{\sqrt{3}}{\cos 10^0}=$

1) 2 2) 4 3) 3 4) none

17. $\sqrt{3}\operatorname{cosec} 20^0-\sec 20^0=$

1) 2 2) $\frac{2\sin 20}{\sin 40}$ 3) 4 4) $\frac{4}{\sqrt{3}}$

18. $\frac{1}{\sin 250^0}+\frac{\sqrt{3}}{\cos 290^0}=$

1) 2 2) 4 3) 3 4) none

19. $\frac{\sqrt{3}}{\sin 160^0}-\frac{1}{\sin 110^0}=$

1) 2 2) 4 3) 3 4) none

20. $\cos\left(\frac{\pi}{5}\right).\cos\left(\frac{2\pi}{5}\right)=$

1) 1/2 2) 3/2 3) 3/4 4) 1/4

21. $\cos 6^0.\cos 42^0.\cos 60^0.\cos 78^0=$

1) 1/2 2) 1/4 3) 1/8 4) 1/16

22. $\sin\frac{\pi}{10}.\sin\frac{13\pi}{10}=$

1) 1/2 2) -1/2 3) -1/4 4) 1

23. If $k=\sin\frac{\pi}{18}.\sin\frac{5\pi}{18}.\sin\frac{7\pi}{18}$, then k=

1) 1/2 2) 1/4 3) 1/8 4) 3/8

24. $\sin\frac{\pi}{5}.\sin\frac{2\pi}{5}.\sin\frac{3\pi}{5}.\sin\frac{4\pi}{5}=$

1) 1/16 2) 7/16 3) 5/16 4) 3/16

25. $\tan 50^0-\tan 40^0=$

1) $2\tan 10^0$ 2) $2\tan 20^0$
3) $2\tan 40^0$ 4) none

26. $\tan\theta\tan\left(60^0+\theta\right).\tan\left(60^0-\theta\right)=$

1) $\cot 3\theta$ 2) $2\cot 3\theta$
3) $\tan 3\theta$ 4) $3\tan 3\theta$

27. $\tan 81^0-\tan 63^0-\tan 27^0+\tan 9^0$ is
1) 1 2) 2
3) 3 4) 4

28. $\tan 57^0-\tan 12^0-\tan 57^0.\tan 12^0=$
1) -1 2) 1
3) 0 4) none

29. $\sin^3 20^0+\sin^3 40^0-\sin^3 80^0=$

1) $\frac{3\sqrt{3}}{8}$ 2) $-\frac{3\sqrt{3}}{8}$

3) $\frac{3\sqrt{3}}{2}$ 4) none

30. $\cos^2 25^0+\cos^2 95^0+\cos^2 145^0=$
1) 1/2 2) 3/2
3) 3/4 4) $1/\sqrt{2}$

SELF TEST KEY

1) 4	2) 2	3) 4	4) 2	5) 1
6) 2	7) 1	8) 1	9) 4	10) 4
11) 1	12) 3	13) 3	14) 4	15) 1
16) 2	17) 3	18) 2	19) 2	20) 4
21) 4	22) 3	23) 3	24) 3	25) 1
26) 3	27) 4	28) 2	29) 2	30) 2

* * *

ALL POWER IS WITHIN
YOU
YOU CAN DO
ANYTHING
AND
EVERYTHING

SPACE FOR IMPORTANT NOTES

TRANSFORMATIONS

SYNOPSIS

- $\sin(A+B)+\sin(A-B)=2\sin A\cos B$
- $\sin(A+B)-\sin(A-B)=2\cos A\sin B$
- $\cos(A+B)+\cos(A-B)=2\cos A\cos B$
- $\cos(A-B)-\cos(A+B)=2\sin A\sin B$

- $\sin C+\sin D=2\sin\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right)$
- $\sin C-\sin D=2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$
- $\cos C+\cos D=2\cos\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right)$
- $\cos C-\cos D=-2\sin\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$

$=2\sin\left(\frac{C+D}{2}\right)\sin\left(\frac{D-C}{2}\right)$

- $\sin 9^0=\frac{1}{4}\left[\sqrt{3+\sqrt{5}}-\sqrt{5-\sqrt{5}}\right]=$

$=\sqrt{\frac{4-\sqrt{10+2\sqrt{5}}}{8}}=$

$=\frac{1}{4}\sqrt{8-2\sqrt{10+2\sqrt{5}}}=\cos 81^0$

- $\cos 9^0=\frac{1}{4}\left[\sqrt{3+\sqrt{5}}+\sqrt{5-\sqrt{5}}\right]=$

$=$

$\sqrt{\frac{4+\sqrt{10+2\sqrt{5}}}{8}}=\frac{1}{4}\sqrt{8+2\sqrt{10+2\sqrt{5}}}$

$=\sin 81^0$

- $\cos x.\cos 2x.\cos 4x.........\cos(2^n x)=$

$\frac{1}{2^{n+1}}\frac{\sin(2^{n+1}x)}{\sin x}$

- $\sin\frac{\pi}{n}+\sin\frac{3\pi}{n}+\sin\frac{5\pi}{n}+....$ n terms $=0$
- $\sin\alpha+\sin(\alpha+\beta)+\sin(\alpha+2\beta)+..$to n terms $=\frac{\sin(n\beta/2)}{\sin(\beta/2)}\sin\left(\frac{2\alpha+(n-1)\beta}{2}\right)$

- $\forall x\in R$, $\tan x+\frac{1}{2}\tan\frac{x}{2}+\frac{1}{2^2}\tan\frac{x}{2^2}+....+\frac{1}{2^{n-1}}\tan\left(\frac{x}{2^{n-1}}\right)$ is equal to

$\frac{1}{2^{n-1}}\cot\left(\frac{x}{2^{n-1}}\right)-2\cot 2x$

- α,β are the solutions of $a\cos\theta+b\sin\theta=c$

$\Rightarrow$

- $\tan\left(\frac{\alpha+\beta}{2}\right)=\frac{b}{a}$ ii. $\sin(\alpha+\beta)=\frac{2ab}{a^2+b^2}$
- $\cos(\alpha+\beta)=\frac{a^2-b^2}{a^2+b^2}$
- $\tan(\alpha+\beta)=\frac{2ab}{a^2-b^2}$

SOLVED EXAMPLES

1. $\cos\frac{\pi}{11}+\cos\frac{3\pi}{11}+\cos\frac{5\pi}{11}+\cos\frac{7\pi}{11}+\cos\frac{9\pi}{11}=$

Sol: Where $\theta_1=\frac{\pi}{11}$, $d=\frac{2\pi}{11}$, $n=5$,

$G.E=\frac{\sin\frac{5}{2}.\frac{2\pi}{11}}{\sin\frac{1}{2}.\frac{2\pi}{11}}.\cos\left[\frac{1}{2}\left(\frac{\pi}{11}+\frac{9\pi}{11}\right)\right]$

$=\frac{\sin\frac{5\pi}{11}}{\sin\frac{\pi}{11}}.\cos\frac{5\pi}{11}=\frac{1}{2}\frac{\sin\frac{10\pi}{11}}{\sin\frac{\pi}{11}}$

$=\frac{1}{2}\frac{\sin\left(\pi-\frac{\pi}{11}\right)}{\sin\frac{\pi}{11}}=\frac{1}{2}.\frac{\sin\frac{\pi}{11}}{\sin\frac{\pi}{11}}=\frac{1}{2}$

2. $\frac{\sin 70^0+\cos 50^0}{\cos 70^0+\sin 50^0}=....$

Sol: G.E. $=\frac{\sin 70^0+\sin 50^0}{\cos 70^0+\cos 50^0}=\tan\left(\frac{70+50}{2}\right)=$

$\tan 60^0=\sqrt{3}$

3. $\frac{\sin x+\sin 2x+\sin 3x+\sin 4x}{\cos x+\cos 2x+\cos 3x+\cos 4x}=$

Sol: G.E. $=\tan\left(\frac{x+4x}{2}\right)=\tan\frac{5x}{2}$

4. $\cos 130^0+\cos 110^0+\cos 10^0=.....$

Sol: $\cos(120+A)+\cos(120-A)+\cos A=0$

Put $A=10^0$ we get

$\cos 130^0+\cos 110^0+\cos 10^0=0$

5. $\frac{\cos 2A+\cos 3A+\cos 5A+\cos 6A}{\sin 2A+\sin 3A+\sin 5A+\sin 6A}=$

$\cot\left(\frac{3A+5A}{2}\right)=\cot 4A$

6. $\left(\frac{\sqrt{3}+2\cos\theta}{1-2\sin\theta}\right)^3+\left(\frac{1+2\sin\theta}{\sqrt{3}-2\cos\theta}\right)^3=$

1) 3 2) 1 3) 0 4) -1

Sol: Put $\theta=0$, $\left(\frac{\sqrt{3}+2}{1}\right)^3+\left(\frac{1+0}{\sqrt{3}-2}\right)^3$

$=\left(\sqrt{3}+2\right)^3-\left(\sqrt{3}+2\right)^3=0$

7. If $A+B+C=$ Then $\Sigma\sin 6A=$

Sol: Since $3A+3B+3C=3\pi$

$\Rightarrow\Sigma\sin 2(3A)=4\sin 3A.\sin 2B.\sin 3C$

$\Rightarrow\Sigma\sin 6A=4\sin 3A.\sin 3B.\sin 3C.$

8. If $A+B+C=\pi$, then

$\sin^2 A-\sin^2 B-\sin^2 C=$

Sol: $\sin^2 A-\sin^2 B-\sin^2 C$

$=\sin(A+B).\sin(A-B)-\sin^2 C$

$=\sin C\sin(A-B)-\sin^2 C=\sin C[\sin(A-B)-\sin C]$

$=\sin C[\sin(A-B)-\sin(A+B)]$

$=\sin C[-2\cos A\sin B]=-2\cos A\sin B\sin C$

9. If $\cos x+\cos y=1/3$, $\sin x+\sin y=1/4$, then $\cos(x+y)=$

Sol: If $\cos\alpha+\cos\beta=b$ and $\sin\alpha+\sin\beta=a$,

then $\cos(\alpha+\beta)=\frac{b^2-a^2}{b^2+a^2}$

$\therefore\cos(x+y)=\frac{(1/3)^2-(1/4)^2}{(1/3)^2+(1/4)^2}=\frac{7}{25}$

10. $\tan 9^0-\tan 27^0-\tan 63^0+\tan 81^0=$

Sol: GE $=\left(\tan 9^0+\tan 81^0\right)-\left(\tan 27^0+\tan 63^0\right)$

$=\left(\tan 9^0+\cot 9^0\right)-\left(\tan 27^0+\cot 27^0\right)$

$$= \frac{2}{\sin 18^0} - \frac{2}{\sin 54^0} = \frac{2.4}{\sqrt{5}-1} - \frac{2.4}{\sqrt{5}+1}$$

$$= 8\left[\frac{\sqrt{5}+1-\sqrt{5}+1}{5-1}\right] = \frac{16}{4} = 4.$$

PRACTICE SET - I

01. $\sin 6\theta - \sin 2\theta =$

1) $2\sin 6\theta\cos 4\theta$ 2) $2\cos 4\theta\sin 2\theta$
3) $2\sin 4\theta\cos 6\theta$ 4) $2\sin 4\theta\cos 2\theta$

02. $\sin A + \sin 3A + \sin 5A + \sin 7A =$

1) $4\sin A\cos 2A\cos 4A$
2) $4\sin A\cos 2A\cos 2A$
3) $4\cos A\sin 2A\sin 4A$
4) $4\cos A\cos 2A\sin 4A$

03. $4\cos 6\theta\cos 4\theta\cos 2\theta =$

1) $\cos 12\theta + \cos 8\theta + \cos 4\theta + 1$
2) $\cos 12\theta + \cos 8\theta - \cos 4\theta + 1$
3) $\cos 12\theta - \cos 8\theta + \cos 4\theta + 1$
4) $\cos 12\theta - \cos 8\theta - \cos 4\theta - 1$

04. $Sin\frac{\theta}{2}Sin\frac{7\theta}{2} + Sin\frac{3\theta}{2}Sin\frac{11\theta}{2} - \sin 2\theta.\sin 5\theta = Z$

1) 0 2) 1 3) -1 4) 2

05. $2(1-2\sin^2\theta)\cos 4\theta =$

1) $\sin 6\theta + \cos 2\theta$ 2) $\sin 6\theta + \sin 2\theta$
3) $\cos 6\theta + \cos 2\theta$ 4) $\cos 6\theta + \sin 2\theta$

06. $(2\cos^2 3\theta - 1)\cos 5\theta =$

1) $\frac{1}{2}[\cos 11\theta + \cos\theta]$ 2) $\frac{1}{2}[\sin 11\theta + \sin\theta]$
3) $\frac{1}{2}[\sin 11\theta + \cos\theta]$ 4) $\frac{1}{2}[\cos 11\theta + \sin\theta]$

07. $\cos 25^0 - \cos 65^0 =$

1) $\sqrt{2}\cos 20^0$ 2) $\sqrt{2}\sin 20^0$
3) $\sqrt{3}\cos 20^0$ 4) $\sqrt{3}\sin 20^0$

08. $\sin 65^0 + \sin 25^0 =$

1) $\sqrt{2}\cos 20^0$ 2) $\sqrt{2}\sin 20^0$
3) $\sqrt{3}\cos 20^0$ 4) $\sqrt{3}\sin 20^0$

09. $\cos 40^0 + \cos 80^0 + \cos 160^0 =$

1) 2 2) 1 3) 0 4) 3

10. $\sin 47^0 - \sin 25^0 + \sin 61^0 - \sin 11^0 =$

1) $\sin 7^0$ 2) $\cos 7^0$ 3) $2\sin 7^0$
4) $\cos 7^0$

11. $\sin 10^0 + \sin 20^0 + \sin 40^0 + \sin 50^0 - \sin 70^0 - \sin 80^0 =$

1) 1/2 2) 0 3) -1/2 4) 1

12. $\cot 16^0 + \cot 44^0 + \cot 44^0.\cot 76^0 - \cot 76^0.\cot 16^0 =$

1) 3 2) 0 3) 1 4) 4

13. $\cos 48^0.\cos 12^0 =$

1) $\frac{1+\sqrt{5}}{8}$ 2) $\frac{1-\sqrt{5}}{8}$
3) $\frac{\sqrt{5}-1}{8}$ 4) $\frac{\sqrt{5}+1}{8}$

14. $\sin 48^0.\sin 12^0 =$

1) $\frac{\sqrt{5}+1}{8}$ 2) $\frac{1+\sqrt{5}}{8}$
3) $\frac{1-\sqrt{5}}{8}$ 4) $\frac{\sqrt{5}-1}{8}$

15. $\cos 66^0 + \sin 84^0 =$

1) $\frac{\sqrt{15}-\sqrt{3}}{4}$ 2) $\frac{\sqrt{15}-3}{4}$
3) $\frac{\sqrt{15}+\sqrt{3}}{4}$ 4) $\frac{\sqrt{15}+3}{4}$

16. $\cos 66^0 + \cos 6^0 =$

1) $\frac{\sqrt{3}(\sqrt{5}-1)}{4}$ 2) $\frac{\sqrt{2}(\sqrt{5}+1)}{4}$
3) $\frac{\sqrt{2}(\sqrt{5}-1)}{4}$ 4) $\frac{\sqrt{3}(\sqrt{5}+1)}{4}$

17. $\sin 24^0 + \cos 6^0 =$

1) $\frac{\sqrt{15}+\sqrt{3}}{4}$ 2) $\frac{\sqrt{15}+3}{4}$
3) $\frac{\sqrt{15}-3}{4}$ 4) $\frac{\sqrt{15}-\sqrt{3}}{4}$

18. $2\cos\theta - \cos 3\theta - \cos 5\theta - 16\cos^3\theta.\sin^2\theta =$

1) 2 2) 0 3) 1 4) -1

19. $\cos 20^0.\cos 40^0.\cos 60^0.\cos 80^0 =$

1) 3/16 2) 1/32 3) 1/16 4) 1/8

20. $\cos 6^0.\sin 24^0.\cos 72^0 =$

1) -1/8 2) 1/8 3) -1/4 4) 1/4

21. $\cos^2 76^0 + \cos^2 16^0 - \cos 76^0.\cos 16^0 =$

1) 1/2 2) -1/4 3) 0 4) 3/4

22. $\cos 10^0.\cos 30^0.\cos 50^0.\cos 70^0 =$

1) 3/16 2) 1/16 3) 1/8 4) 1/32

23. $Cos^2(45^0-\alpha) + \cos^2(15^0+\alpha) - \cos^2(15^0-\alpha) =$

1) 0 2) 1 3) 1/2 4) 2

24. $\frac{\cos(45^0+A) - Cos(45^0-A)}{\sin(120^0+A) - \sin(120^0-A)} =$

1) 2 2) $\sqrt{2}$ 3) $2\sqrt{2}$ 4) $\pm\sqrt{2}$

25. $\frac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x} =$

1) $2\cos x$ 2) $2\sin x$ 3) $\cos x$ 4) $\sin x$

26. $\frac{\sin\alpha.\sin 3\alpha + \sin 3\alpha.\sin 7\alpha + \sin 5\alpha.\sin 15\alpha}{\sin\alpha.\cos 3\alpha + \sin 3\alpha\cos 7\alpha + \sin 5\alpha.\cos 15\alpha} =$

1) $\sin(11\alpha)$ 2) $\cot(11\alpha)$
3) $\cos(11\alpha)$ 4) $\tan(11\alpha)$

27. $\frac{1-\cos A + \cos B - \cos(A+B)}{1+\cos A - \cos B - \cos(A+B)} =$

1) $\sin\frac{A}{2}.\cos\frac{B}{2}$ 2) $\sec\frac{A}{2}\cos ec\frac{B}{2}$
3) $\tan\frac{A}{2}.\cot\frac{B}{2}$ 4) $2\sin\frac{A}{2}.\cos\frac{B}{2}$

28. $\frac{\sin A + \sin 5A + \sin 9A}{\cos A + \cos 5A + \cos 9A} =$

1) tan 3A 2) tan 5A 3) tan 4A 4) tan 2A

29. $\sin\alpha + \sin\beta = a, \cos\alpha + \cos\beta = b$
$\Rightarrow \cos(\alpha+\beta) =$

1) $\frac{a^2+b^2}{2ab}$ 2) $\frac{2ab}{a^2+b^2}$
3) $\frac{b^2-a^2}{b^2+a^2}$ 4) $\frac{ab}{a^2+b^2}$

30. $\sin\alpha + \sin\beta = a, \cos\alpha + \cos\beta = b$
$\Rightarrow \sin(\alpha+\beta) =$

1) ab 2) a+b
3) $\frac{2ab}{a^2-b^2}$ 4) $\frac{2ab}{a^2+b^2}$

31. $\cos x + \cos y = \frac{4}{5}, \cos x - \cos y = \frac{2}{7}$
$\Rightarrow 14\tan\left(\frac{x-y}{2}\right) + 5\cot\left(\frac{x+y}{2}\right) =$

1) 0 2) 1/4 3) 5/4 4) 3/4

32. $\sin x + \sin y = \frac{1}{4}, \sin x - \sin y = \frac{1}{5}$
$\Rightarrow 4\cot\left(\frac{x-y}{2}\right) =$

1) $5\cot\left(\frac{x-y}{2}\right)$ 2) $5\tan\left(\frac{x-y}{2}\right)$
3) $5\cot\left(\frac{x+y}{2}\right)$ 4) $5\tan\left(\frac{x+y}{2}\right)$

33. If n is an odd integer then
$\left(\frac{\cos A + \cos B}{\sin A - \sin B}\right)^n + \left(\frac{\sin A + \sin B}{\cos A - \cos B}\right)^n =$

1) 0 2) $\cot^n\left(\frac{A+B}{2}\right)$
3) $\cot^n\left(\frac{A-B}{2}\right)$ 4) $2\tan^n\left(\frac{A+B}{2}\right)$

34. $\frac{\sin(x+y)}{\sin(x-y)}=\frac{a+b}{a-b}\Rightarrow\frac{\tan x}{\tan y}=$

1) b/a 2) a/b 3) 1 4) 0

35. $\sin x+\sin y=3(\cos y-\cos x)$

$\Rightarrow \sin 3x+\sin 3y=$

1) -1 2) 1 3) 2 4) 0

36. $m.\tan(\theta-30^0)=n.\tan(\theta+120^0)$,

$\Rightarrow \cos 2\theta=$

1) $\frac{m-n}{2(m-n)}$ 2) $\frac{m+n}{2(m-n)}$

3) $\frac{m-n}{2(m+n)}$ 4) $\frac{m-n}{2(m+n)}$

37. $\cot(15^0-A)+\tan(15^0+A)=$

1) $\frac{4\cos 2A}{1+2\cos 2A}$ 2) $\frac{4\cos 2A}{1-2\sin 2A}$

3) $\frac{4\cos 2A}{1+2\sin 2A}$ 4) $\frac{4\cos 2A}{1-2\cos 2A}$

38. $x=\cos 55^0, y=\cos 65^0, z=\cos 175^0$

$\Rightarrow xy+yz+zx=$

1) -3/4 2) 3/4 3) 3/2 4) 1/2

PRACTICE SET - I KEY

01) 2	02) 4	03) 1	04) 1	05) 3
06) 1	07) 2	08) 1	09) 3	10) 4
11) 2	12) 3	13) 2	14) 4	15) 3
16) 4	17) 1	18) 2	19) 3	20) 2
21) 4	22) 1	23) 3	24) 2	25) 1
26) 4	27) 3	28) 2	29) 3	30) 4
31) 1	32) 3	33) 1	34) 2	35) 4
36) 2	37) 2	38) 1		

PRACTICE SET - II

01. In a Quadrilateral ABCD,

$\cos A.\cos B+\sin C\sin D=$

1) $\cos C\cos D+\sin A\sin B$

2) $\cos C\cos D-\sin A\sin B$

3) $\sin C\sin D-\cos A\cos B$

4) $\sin A+\sin B+\sin C+\sin D$

02. $\cos\frac{\pi}{7}+\cos\frac{2\pi}{7}+\cos\frac{3\pi}{7}+\cos\frac{4\pi}{7}+\cos\frac{5\pi}{7}$

$+\cos\frac{6\pi}{7}+\cos\frac{7\pi}{7}=$

1) 0 2) 1 3) -1 4) None

03. $\sin\alpha+\cos\alpha=m\Rightarrow \sin^6\alpha+\cos^6\alpha=$

1) $\frac{4+3(m^2-1)^2}{4}$ 2) $\frac{4-3(m^2-1)^2}{4}$

3) $\frac{3+4(m^2-1)^2}{4}$ 4) None

04. $\sin\frac{\pi}{4}.\sin\frac{3\pi}{4}.\sin\frac{5\pi}{4}.\sin\frac{7\pi}{4}=$

1) $\sqrt{2}/7$ 2) 1/4 3) 1/8 4) 1

05. $\sin\frac{\pi}{14}.\sin\frac{3\pi}{14}.\sin\frac{5\pi}{14}.\sin\frac{7\pi}{14}.\sin\frac{9\pi}{14}$

$\sin\frac{11\pi}{14}.\sin\frac{13\pi}{14}=$

1) 1/64 2) 3/64 3) 5/64 4) 7/64

06. $\sin 81^0=$

1) $\frac{\sqrt{3+\sqrt{5}}-\sqrt{5-\sqrt{5}}}{4}$

2) $\frac{\sqrt{3+\sqrt{5}}+\sqrt{5-\sqrt{5}}}{4}$

3) $\frac{\sqrt{3-\sqrt{5}}-\sqrt{5+\sqrt{5}}}{4}$

4) $\frac{\sqrt{3-\sqrt{5}}+\sqrt{5+\sqrt{5}}}{4}$

07. $\cos x+\cos y+\cos z=0=$

$\sin x+\sin y+\sin z\Rightarrow \cos^2\left(\frac{x-y}{2}\right)$

1) $\frac{1}{2}$ 2) $\frac{1}{4}$ 3) $\frac{3}{4}$ 4) 1

08. $\sin 70^0.\sin 50^0-\cos 85^0\cos 65^0=$

1) 0 2) 1

3) $\frac{\sqrt{5}+1}{4}$ 4) $\frac{\sqrt{3}+1}{4}$

09. $\frac{\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2}}}}}{2}=$

1) $\cos\frac{\pi}{4}$ 2) $\cos\frac{\pi}{8}$

3) $\cos\frac{\pi}{16}$ 4) $\cos\frac{\pi}{32}$

10. $A+B+C=180^0\Rightarrow$

$\cos 2A+\cos 2B+\cos 2C=$

1) $1-4\sin A\sin B\sin C$

2) $1+4\sin A\sin B\sin C$

3) $1+4\cos A\cos B\cos C$

4) $-1-4\cos A\cos B\cos C$

11. $A+B+C=180^0\Rightarrow$

$\cos^2 A+\cos^2 B+\cos^2 C=$

1) $1+2\cos A\cos B\cos C$

2) $1+2\sin A\sin B\sin C$

3) $1-2\cos A\cos B\cos C$

4) $1-2\sin A\sin B\sin C$

12. $A+B+C=180^0\Rightarrow$

$\cos A-\cos B+\cos C=$

1) $1+4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

2) $1+4\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

3) $-1+4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$

4) $-1-4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

13. $A+B+C=180^0\Rightarrow$

$\cos^2 2A+\cos^2 2B+\cos^2 2C=$

1) $1+2\sin A\sin B\sin C$

2) $1+2\cos A\cos B\cos C$

3) $1+2\sin 2A\sin 2B\sin 2C$

4) $1+2\cos 2A\cos 2B\cos 2C$

14. $A+B+C=180^0$

$\Rightarrow \cos^2\frac{A}{2}+\cos^2\frac{B}{2}+\cos^2\frac{C}{2}=$

1) $1+2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

2) $1+2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

3) $2+2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

4) $2+2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

15. $A+B+C=180^0$

$\Rightarrow \sin 2A-\sin 2B+\sin 2C=$

1) $2\sin A\cos B\sin C$

2) $2\cos A\sin B\cos C$

3) $2\sin A\cos B\sin C$

4) $4\cos A\sin B\cos C$

16. $A+B+C=180^0$ $\sin A+\sin B+\sin C=$

1) $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$ 2) $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

3) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

4) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

17. $A+B+C=180^0$ $\sin^2 A+\sin^2 B+\sin^2 C=$

1) $1+\cos A\cos B\cos C$

2) $1+\sin A\sin B\sin C$

3) $2(1+\cos A\cos B\cos C)$

4) $2(1+\sin A\sin B\sin C)$

18. $A+B+C=180^0 \Rightarrow \sin^2\frac{A}{2}+\sin^2\frac{B}{2}+\sin^2\frac{C}{2}=$

1) $1+2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

2) $1+2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

3) $1-2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

4) $1-2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

19. $A+B+C=90^0 \Rightarrow \cos 2A+\cos 2B+\cos 2C=$

1) $1-4\cos A\cos B\cos C$
2) $1-4\sin A\sin B\sin C$
3) $1+4\cos A\cos B\cos C$
4) $1+4\sin A\sin B\sin C$

20. $A+B+C=90^0 \Rightarrow \cos^2 A+\cos^2 B+\cos^2 C=$

1) 1+2 sin A sin B sin C
2) 1+2 cosA cosB cos C
3) 2+2sinAsinB sinC
4) 2+2 cosAcosB cosC

21. $A+B+C=90^0 \Rightarrow \sin 2A+\sin 2B-\sin 2C=$

1) 2 cos A cos B sinC
2) 2 sin A sin B sin C
3) 4 cos A cos B sin C
4) 4 sin A sin B cos C

22. $A+B+C=90^0 \Rightarrow \sin^2 A+\sin^2 B+\sin^2 C=$

1) 1+2 cos A cos B cos C
2) 1+2 sin A sin B sin C
3) 1-2 sin A sin B sin C
4) 1-2 cos A cos B cos C

23. $A+B+C=270^0 \Rightarrow \cos 2A+\cos 2B+\cos 2C=$

1) 1+4 cosA cos B cos C
2) 1+4 sin A sin B sin C
3) 1-4 cos A cos B cos C
4) 1-4 sin A sin B sin C

24. $A+B+C=270^0 \Rightarrow \cos^2 A+\cos^2 B-\cos^2 C=$

1) -2 sin A sin B cos C
2) -2 cos A cos B sin C
3) 2 sin A sin B cos C
4. 2 cosA cos B sin C

25. $A+B+C=270^0 \Rightarrow \sin 2A-\sin 2B+\sin 2C=$

1) 4 sin A cos B sin C
2) 4 cos A sin B cos C
3) -4 sin A cos B sin C
4) -4 cos A sin B cos C

26. $A+B+C=270^0 \Rightarrow \sin^2 A-\sin^2 B+\sin^2 C=$

1) 1-2cos A sin B cos C
2) 1-2 sin A cos B sin C
3) 1+ 2 cos A sin B cos C
4) 1+2 sin A cos B sin C

27. $A+B+C=0^0 \Rightarrow \cos^2 A+\cos^2 B+\cos^2 C=$

1) 1+2 cos A cos B cos C
2) 1+2 sin A sin B sin C
3) 1-2 cos A cos B cos C
4) 1-2 sin A sin B sin C

28. $A+B+C=0^0 \Rightarrow \sin A+\sin B+\sin C=$

1) $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

2) $-2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

3) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

4) $-4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

29. $A+B+C=0^0$

$\Rightarrow \sin^2 A-\sin^2 B+\sin^2 C=$

1) 1-cosA cos B cos C
2) 1+ cos A cos B cos C
3) 2(1+cos A cos B cos C)
4) 2 (1-cos A cos B cos C)

30. $A+B+C=2S \Rightarrow$

$\sin S.\sin(S-A)+\sin(S-B)-\sin(S-C)=$

1) sin A sin B
2) sin B sin C
3) sin C sin A
4) sin A sin B sin C

31. $A+B+C=2S \Rightarrow$

$\sin(S-A)+\sin(S-B)+\sin(S-C)-\sin S=$

1) $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

2) $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

3) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

4) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

32. $A+B+C=2S$

$\Rightarrow \cos S+\cos(S-A)+\cos(S-B)+\cos(S-C)=$

1) $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

2) $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

3) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

4) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

33. $A+B+C=2S$

$\Rightarrow \cos(S-A)+\cos(S-B)+\cos C+1=$

1) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\left(\frac{S-C}{2}\right)$

2) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\left(\frac{S-C}{2}\right)$

3) $4\cos\left(\frac{S-A}{2}\right)\cos\left(\frac{S-B}{2}\right)\cos\frac{C}{2}$

4) $4\sin\left(\frac{S-A}{2}\right)\cos\left(\frac{S-B}{2}\right)\sin\frac{C}{2}$

PRACTICE SET - II KEY

1) 1	2) 3	3) 2	4) 3	5) 1
6) 2	7) 2	8) 4	9) 4	10) 4
11) 3	12) 3	13) 4	14) 3	15) 4
16) 4	17) 3	18) 3	19) 4	20) 3
21) 4	22) 3	23) 4	24) 2	25) 3
26) 3	27) 1	28) 4	29) 4	30) 2
31) 4	32) 3	33) 3		

SELF TEST

01. If n is an odd positive integer, then $\left(\frac{\cos A+\cos B}{\sin A-\sin B}\right)^n+\left(\frac{\sin A+\sin B}{\cos A-\cos B}\right)^n=$

1) 1 2) -1 3) 0 4) None

02. If n is an even positive integer, then $\left(\frac{\cos A+\cos B}{\sin A-\sin B}\right)^n+\left(\frac{\sin A+\sin B}{\cos A-\cos B}\right)^n=$

1) 1 2) -1 3) 0 4) None

03. $\frac{\sin 70^0+\cos 40^0}{\cos 70^0+\sin 40^0}=$

1) $\sqrt{3}$ 2) 1 3) $1/\sqrt{3}$ 4) None

04. $\frac{\cos 2A-\cos 2B}{\sin 2A+\sin 2B}=$

1) $\tan(A+B)$ 2) $\tan(B-A)$
3) $\cos(A+B)$ 4) $\sin(A+B)$

05. $\frac{\sin A+\sin 5A+\sin 9A}{\cos A+\cos 5A+\cos 9A}=$

1) $\tan 5A$ 2) $\tan 4A$ 3) $\tan 3A$ 4) $\tan A$

06. $\frac{\sin 3\theta+\sin 5\theta+\sin 7\theta+\sin 9\theta}{\cos 3\theta+\cos 5\theta+\cos 7\theta+\cos 9\theta}=$

1) $\tan 2\theta$ 2) $\tan 3\theta$ 3) $\tan 6\theta$ 4) $\tan 5\theta$

07. $\sin A+\sin 3A+\sin 5A+\sin 7A=$

1) $4\sin A\cos 2A\cos 4A$
2) $4\cos A\cos 2A\cos 4A$
3) $4\cos A\cos 2A\sin 4A$
4) None

08. $2\sin 3\theta\left(1-2\sin^2\theta\right)=$

1) $\sin 5\theta-\sin\theta$ 2) $\sin 5\theta+\sin\theta$
3) $\cos 5\theta+\cos\theta$ 4) $\cos 5\theta-\cos\theta$

09. If $\cos x+\cos y=1/3$ and $\sin x+\sin y=1/4$, then the value of $\cos(x+y)=$

1) 7/25 2) 7/24 3) 8/25 4) None

10. $\cos x+\cos y=1/3, \sin x+\sin y=1/4$ then $\sin(x+y)=$

1) 24/25 2) 12/13 3) 15/20 4) 1/2

11. If $\sin x+\sin y=3/4, \sin x-\sin y=3/5$ then $\tan\left(\frac{x+y}{2}\right)\cot\left(\frac{x-y}{2}\right)=$

1) 0 2) 3/4 3) 5/4 4) 5/2

12. $\sin 50^0-\sin 70^0+\sin 10^0=$

1) 0 2) $1/\sqrt{3}$ 3) $1/\sqrt{2}$ 4) 3

13. $\cos 35^0+\cos 85^0+\cos 155^0=$

1) 1 2) 2 3) 0 4) 3

14. $\sin 47^0-\sin 25^0+\sin 61^0-\sin 11^0=$

1) $\cos 7^0$ 2) $\sin 7^0$ 3) $2\cos 7^0$ 4) $2\sin 7^0$

15. $\frac{\sin(x+y)}{\sin(x-y)}=\frac{a+b}{a-b}$, then $\frac{\tan x}{\tan y}=$

1) b/a 2) a/b 3) ab 4) None

16. If $m\tan(\theta-30^0)=n\tan(\theta+120^0)$ then $\cos 2\theta=$

1) $\frac{m+n}{m-n}$ 2) $2\frac{m+n}{m-n}$ 3) $\frac{1}{2}\frac{m+n}{m-n}$ 4) $\frac{m-n}{m+n}$

17. If $(a-b)\sin(A+B)=(a+b)\sin(A-B)$ then $\frac{\tan A}{\tan B}=$

1) a 2) b 3) a/b 4) b/a

18. If $\cot A.\cot B.\cot C=\cot D.$ then $\frac{\cos(A+B)}{\cos(A-B)}=$

1) $\frac{\sin(C-D)}{\sin(C+D)}$ 2) $\frac{\sin(C+D)}{\sin(C-D)}$

3) $\frac{\sin(C+D)}{\cos(C-D)}$ 4) $\frac{\sin(C-D)}{\cos(C+D)}$

19. $\cos A+\cos B+\cos C+\cos(A+B+C)=4\cos\frac{A+B}{2}.k$ then k =

1) $\cos\frac{B}{2}\cos\frac{C}{2}$ 2) $\cos\frac{B+C}{2}\cos\frac{C+A}{2}$

3) $\sin\frac{B}{2}\sin\frac{C}{2}$ 4) $\sin\frac{B+C}{2}\sin\frac{C+A}{2}$

20. $4\sin 2\theta\cos 3\theta\sin 5\theta=$

1) $1-\cos 4\theta+\cos 6\theta-\cos 10\theta$

2) $1+\cos 4\theta+\cos 6\theta-\cos 10\theta$

3) $1-\cos 4\theta+\cos 6\theta+\cos 10\theta$

4) $1+\cos 4\theta+\cos 6\theta+\cos 10\theta$

21. $2\cos\theta-\cos 3\theta-\cos 5\theta-16\cos^3\theta\sin^2\theta=$

1) 0 2) 1 3) 2 4) 3

22. If $A+B+C+D=180^0$ then $\cos A\cos B+\cos C\cos D=$

1) $\sin A\sin B+\sin C\sin D$

2) $\sin A\sin B-\sin C\sin D$

3) $\sin A+\sin B+\sin C\sin D$ 4) None

23. If $A+B+C$ then $\cos^2 A+\cos^2 B+\cos^2 C-2\cos A\cos B\cos C=$

1) 1 2) 0 3) -1 4) 2

24. $Tanx\tan(x+60^0)+\tan x.\tan(x-60^0)+\tan(x+60^0)\tan(x-60^0)=$

1) 0 2) -1 3) -2 4) -3

SELF TEST KEY

01) 3	02) 4	03) 1	04) 2	05) 1
06) 3	07) 3	08) 2	09) 1	10) 1
11) 3	12) 3	13) 1	14) 1	15) 2
16) 4	17) 3	18) 1	19) 2	20) 1
21) 1	22) 1	23) 1	24) 4	

TRIGONOMETRIC EQUATIONS

- An equation consisting of the trigonometric function of a variable angle $\theta\in R$ is called a trigonometric equation.
- The equatons of the forms $f(x)=k$ when $f(x)=\sin x$ of $\cos x$ or $\tan x$ etc is called canonical equation. Only these equations have "Principal solutioons"
- Every trigonometric equation can be reduced to one or more of the canonical equation. For this reason it is not possible to define principal solution of a general trigonometric equation.
- The value of a varaible angle θ, that is any number θ, satisfying the given trigonometric equation is called a "solution" of the equation.
- The set of all solutions of a trigonometric equation is called "solution set" of the equation.
- A "general solution" of the equation is an expression of the form $\theta_0+f(n)$ where θ_0 is a particular solution and $f(n)$ is a function of $n\in z$ involving π.

Sl. No.	Equation	Solution
1	$\sin\theta=0$	$\theta=n\pi, n\in z$
2	$\cos\theta=0$	$\theta=(2n+1)\frac{\pi}{2}, n\in z$
3	$\tan\theta=0$	$\theta=n\pi, n\in z$
4	$\sin\theta=\sin\alpha$ or $\operatorname{cosec}\theta=\operatorname{cosec}\alpha$	$\theta=n\pi+(-1)^n\alpha, n\in z$
5	$\cos\theta=\cos\alpha$ or $\sec\theta=\sec\alpha$	$\theta=2n\pi\pm\alpha, n\in z$
6	$\tan\theta=\tan\alpha$ or $\cot\theta=\cot\alpha$	$\theta=n\pi+\alpha, n\in z$

SOLVED EXAMPLES

1. If $\tan\theta=1$, the principal value of θ is

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) none

Sol: Ans : 1

$\tan\theta=1=\tan 45^0$

i.e., $\theta=\frac{\pi}{4}$

2. The general solution of $\cos\theta-2\sin\theta\cos\theta=0$ is

1) $n\pi+(-1)^n\frac{\pi}{6}$ 2) $2n\pi+(-1)^n\frac{\pi}{6}$

3) $n\pi+(-1)^n\frac{\pi}{3}$ 4) none

Sol: Ans : 1

$\cos\theta-2\sin\theta\cos\theta=0$

$\Rightarrow\cos\theta(1-2\sin\theta)=0$

$\Rightarrow \cos\theta=0$ or $\sin\theta=\frac{1}{2}$

$\cos\theta=0=\cos\frac{\pi}{2}$

$\Rightarrow$ General solution of $\theta=2n\pi\pm\frac{\pi}{2}$

$\sin\theta=\frac{1}{2}=\sin\frac{\pi}{6}$

$\Rightarrow$ General solution of $\theta=n\pi+(-1)^n\frac{\pi}{6}$

3. The general solution of $2\tan^2\theta+\sec^2\theta=2$ is

1) $2n\pi\pm\frac{\pi}{6}$ 2) $n\pi\pm\frac{\pi}{6}$

3) $2n\pi\pm\frac{\pi}{3}$ 4) $n\pi\pm\frac{\pi}{3}$

Sol: Ans : 2

$2\tan^2\theta+\sec^2\theta=2$

$\Rightarrow 2\tan^2\theta+1+\tan^2\theta=2$

$\Rightarrow 3\tan^2\theta=1$ or $\tan\theta=\pm\frac{1}{\sqrt{3}}$

$\tan\theta=\frac{1}{\sqrt{3}}=\tan\frac{\pi}{6}$ and

$\tan\theta=\frac{-1}{\sqrt{3}}=\tan\left(\frac{-\pi}{6}\right)$

$\therefore \theta=n\pi\pm\frac{\pi}{6}$

4. The general solution of $\cos 2\theta+\cos 8\theta-\cos 5\theta$ is

1) $(2n\pm1)\frac{\pi}{10}$ 2) $(4n\pm1)\frac{\pi}{10}$

3) $(2n\pm1)\frac{\pi}{5}$ 4) none

Sol: Ans: 2

$\cos 2\theta+\cos 8\theta=\cos 5\theta$

$\Rightarrow 2\cos 5\theta\cos 3\theta-\cos 5\theta=0$

$\Rightarrow \cos 5\theta(2\cos 3\theta-1)=0$

$\cos 5\theta=0=\cos\frac{\pi}{2}$

$\Rightarrow 5\theta=2n\pi\pm\frac{\pi}{2}=(4n\pm1)\frac{\pi}{2}$

$\therefore \theta=(4n\pm1)\frac{\pi}{10}$

$\cos 3\theta=\frac{1}{2}=\cos\frac{\pi}{3}$

$\Rightarrow 3\theta=2n\pi\pm\frac{\pi}{3}\Rightarrow\theta=(6n\pm1)\frac{\pi}{9}$

5. The general solution of

$\sin^2\theta+(1+\sqrt{3})\sin\theta\cos\theta+\sqrt{3}\cos^2\theta=0$ is

1) $2n\pi+\frac{\pi}{3}$ 2) $2n\pi-\frac{\pi}{3}$

3) $n\pi-\frac{\pi}{3}$ 4) $n\pi+\frac{\pi}{3}$

Sol: Ans : 3

$\sin^2\theta+(1+\sqrt{3})\sin\theta\cos\theta+\sqrt{3}\cos^2\theta=0$

$\Rightarrow \tan^2\theta+(1+\sqrt{3})\tan\theta+\sqrt{3}=0$

$=(\tan\theta+1)(\tan\theta+\sqrt{3})=0$

$=\tan\theta=-1$ or $\tan\theta=-\sqrt{3}$

$\tan\theta=-1=\tan\left(\frac{-\pi}{4}\right)\Rightarrow\theta=n\pi-\frac{\pi}{4}$

$\tan\theta=-\sqrt{3}=\tan\left(\frac{-\pi}{3}\right)\Rightarrow\theta=n\pi-\frac{\pi}{3}$

6. The principal of $\theta+45^0$ from $\sin\theta+\cos\theta=\sqrt{2}$ is

1) 90^0 2) 60^0 3) 45^0 4) 30^0

Sol: Ans : 1

$\sin\theta+\cos\theta=\sqrt{2}$

$\Rightarrow\frac{1}{\sqrt{2}}\sin\theta+\frac{1}{\sqrt{2}}\cos\theta=1\Rightarrow\sin\left(\theta+\frac{\pi}{4}\right)=\sin\frac{\pi}{2}$

$\therefore$ Principal value of $\theta+45^0=90^0$

7. If $3\tan(\theta-15^0)=\tan(\theta+15^0)$. $0<\theta<\pi$, then $\theta=$

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{6}$

Sol: Ans : 1

$3\tan(\theta-15^0)=\tan(\theta+15^0), 0<\theta<\pi$

Consider $\theta=45^0=\frac{\pi}{4}$, then

$3\tan(45^0-15^0)=3\times\frac{1}{\sqrt{3}}=\sqrt{3}$,

$\tan(45^0+15^0)=\sqrt{3}$

8. The value of θ satisfying

$\sin 7\theta=\sin 4\theta-\sin\theta$ and $0<\theta<\frac{\pi}{2}$ are

1) $\frac{\pi}{9},\frac{\pi}{4}$ 2) $\frac{\pi}{3},\frac{\pi}{9}$ 3) $\frac{\pi}{6},\frac{\pi}{9}$ 4) $\frac{\pi}{3},\frac{\pi}{4}$

Sol: Ans : 1

$\sin 7\theta=\sin 4\theta-\sin 4\theta$

$\Rightarrow\sin 7\theta+\sin\theta=\sin 4\theta$

or $2\sin 4\theta\cos 3\theta-\sin 4\theta=0$

$\Rightarrow\sin 4\theta(2\cos 3\theta-1)=0$

$\Rightarrow\sin 4\theta=0$ or $\cos 3\theta=\frac{1}{2}$

i.e., $\theta=\frac{\pi}{4}$, or $3\theta=\frac{\pi}{3}$ $\therefore\theta=\frac{\pi}{4}$ or $\theta=\frac{\pi}{9}$

9. The general solution of $7\sin^2x+3\cos^2x=4$ is

1) $2n\pi\pm\frac{\pi}{6}$ 2) $n\pi\pm\frac{\pi}{6}$

3) $n\pi\pm\frac{\pi}{3}$ 4) none

Sol: Ans : 2

$7\sin^2x+3\cos^2x=4$

$\Rightarrow 7\sin^2x+3(1-\sin^2x)=4$ $\Rightarrow 4\sin^2x=1$

consider $\cos 2x=1-2\sin^2x$

$=1-2\times\frac{1}{4}=\frac{1}{2}=\cos\frac{\pi}{3}$

$\Rightarrow 2x=2n\pi\pm\frac{\pi}{3}\Rightarrow x=n\pi\pm\frac{\pi}{6}$

10. The general solution of $\sin^2x-2\cos x+\frac{1}{4}=0$ is

1) $2n\pi\pm\frac{\pi}{3}$ 2) $n\pi\pm\frac{\pi}{3}$

3) $2n\pi\pm\frac{\pi}{6}$ 4) none

Sol: Ans : 1

11. If $\tan\theta=\frac{\cos 9^0+\sin 9^0}{\cos 9^0-\sin 9^0}$, then $\theta=$

1) $2n\pi+\frac{3\pi}{10}$ 2) $2n\pi-\frac{3\pi}{10}$

3) $n\pi+\frac{3\pi}{10}$ 4) $n\pi-\frac{3\pi}{10}$

Sol: Ans : 3

12. If $\tan 5\theta=\cot 3\theta$, then the general solution of θ is

1) $(2n+1)\frac{\pi}{16}$ 2) $(2n-1)\frac{\pi}{16}$

3) $(2n+1)\frac{\pi}{8}$ 4) none

Sol: Ans : 1

$\tan 5\theta=\cot 3\theta$

$\Rightarrow\tan 5\theta=\tan\left(\frac{\pi}{2}-3\theta\right)\Rightarrow 5\theta=\frac{\pi}{2}-3\theta$

$\Rightarrow 8\theta=(2n+1)\frac{\pi}{2}$ or $\theta=(2n+1)\frac{\pi}{16}$

13. If $\sin\theta=\cos 4\theta$ and θ is an acute angle then $\sin\theta=$

1) $\frac{\sqrt{5}-1}{4}$ 2) $\frac{\sqrt{5}+1}{4}$ 3) 0 4) none

Sol: Ans : 1

$\sin\theta=\cos 4\theta$

$\Rightarrow\sin\theta=\sin\left(\frac{\pi}{2}-4\theta\right)$

$\Rightarrow\theta=\frac{\pi}{2}-4\theta$ $\Rightarrow 5\theta=\frac{\pi}{2}$ i.e., $\theta=\frac{\pi}{10}$

$\therefore\sin\theta=\sin\frac{\pi}{10}=\frac{\sqrt{5}-1}{4}$

14. The most general value of θ, that satisfying $\sin\theta=\frac{-1}{2}$ and $\tan\theta=\frac{1}{\sqrt{3}}$ is

1) $n\pi+\frac{7\pi}{6}$ 2) $n\pi-\frac{7\pi}{6}$

3) $2n\pi+\frac{7\pi}{6}$ 4) $2n\pi-\frac{7\pi}{6}$

Sol: Ans : 3

15. The number of solutions of the equation $3(\sin x+\cos x)-2(\sin^3 x+\cos^3 x)=8$ is

1) 1 2) 2 3) no solution 4) 3

Sol: Ans : 3

Consider $(\sin x+\cos x)^3$

$=\sin^3 x+\cos^3 x+3\sin x\cos^2 x+3\sin^2 x\cos x$

$=\sin^3 x+\cos^3 x+3\sin x(1-\sin^2 x)+3\cos x(1-\cos^2 x)$

$=3(\sin x+\cos x)-2(\sin^3 x+\cos^3 x)$ Given that

$3(\sin x+\cos x)-2(\sin^3 x+\cos^3 x)=8$

$\Rightarrow(\sin x+\cos x)^3=8 \Rightarrow \sin x+\cos x=2$

$\Rightarrow \sin x=\cos x=1$

which is not possible for any value of x.

Hence the given equation has no solution

PRACTICE SET - I

01. The general solution of the equaton $2\cos x+1=0$ is

1) $2n\pi\pm\frac{\pi}{3}$ 2) $2n\pi\pm\frac{2\pi}{3}$

3) $2n\pi\pm\frac{\pi}{6}$ 4) none

02. The general solution of the equation $2\sin\theta-1=0$ is

1) $n\pi+\frac{\pi}{6}$ 2) $n\pi-\frac{\pi}{6}$

3) $n\pi+(-1)^n\frac{\pi}{6}$ 4) none

03. The general solution of $\tan\theta+\sqrt{3}=0$ is

1) $n\pi-\frac{\pi}{3}$ 2) $n\pi+\frac{\pi}{3}$

3) $2n\pi+\frac{\pi}{3}$ 4) $2n\pi-\frac{\pi}{3}$

04. The general solution of $\sqrt{3}\operatorname{cosec}\theta+2=0$ is

1) $n\pi+\frac{\pi}{3}$ 2) $n\pi-(-1)^n\frac{\pi}{3}$

3) $n\pi-\frac{\pi}{3}$ 4) none

05. The general solution of $\sec\theta+\sqrt{2}=0$ is

1) $2n\pi\pm\frac{3\pi}{4}$ 2) $n\pi\pm\frac{3\pi}{4}$

3) $n\pi+\frac{3\pi}{4}$ 4) $2n\pi+\frac{3\pi}{4}$

06. The general solution of $4\cos^2\theta-3=0$ is

1) $2n\pi+\frac{\pi}{6}$ 2) $n\pi+\frac{\pi}{6}$

3) $2n\pi-\frac{\pi}{6}$ 4) none

07. The general solution of $3\operatorname{cosec}^2\theta-4=0$ is

1) $n\pi+\frac{\pi}{3}$ 2) $n\pi-\frac{\pi}{3}$ 3) $n\pi\pm\frac{\pi}{3}$ 4) $n\pi$

08. The general solution of $\sin 2\theta-\sqrt{3}\cos\theta=0$ is

1) $2n\pi+\frac{\pi}{2}$ 2) $2n\pi\pm\frac{\pi}{2}$ or $n\pi+(-1)^n\frac{\pi}{3}$

3) $n\pi+\frac{\pi}{3}$ 4) none

09. The general solution of $\sqrt{2}\tan\theta\sin\theta+\sqrt{2}\sin\theta=\tan\theta+1$ is

1) $2n\pi+\frac{\pi}{4}$ 2) $n\pi+\frac{\pi}{4}$

3) $n\pi+(-1)^n\frac{\pi}{4}$ 4) none

10. The general solution of $2\tan^2 x+\sec^2 x=4$ is

1) $n\pi\pm\frac{\pi}{4}$ 2) $2n\pi\pm\frac{\pi}{4}$

3) $2n\pi-\frac{\pi}{4}$ 4) none

11. The general solution of $\sin^2\theta-2\cos\theta+\frac{1}{4}=0$ is

1) $n\pi-\frac{\pi}{3}$ 2) $2n\pi\pm\frac{\pi}{3}$ 3) $n\pi+\frac{\pi}{3}$ 4) none

12. The general solution of $\tan^2\theta+\sec\theta=1$ is

1) $2n\pi+\frac{\pi}{3}$ 2) $2n\pi$ or $n\pi\pm\frac{\pi}{3}$

3) $2n\pi$ or $2n\pi+\frac{2\pi}{3}$ 4) none

13. The general solution of $\sin^2\theta-\cos 2\theta=\frac{5}{4}$ is

1) $n\pi\pm\frac{\pi}{3}$ 2) $2n\pi\pm\frac{\pi}{3}$

3) $n\pi\pm\frac{\pi}{6}$ 4) none

14. The general solution of $2\sin\theta+1=\operatorname{cosec}\theta$ is

1) $n\pi+(-1)^n\frac{\pi}{6}$ or $n\pi-(-1)^n\frac{\pi}{2}$

2) $2n\pi+(-1)^n\frac{\pi}{6}$ or $2n\pi-(-1)^n\frac{\pi}{6}$

3) $2n\pi+\frac{\pi}{6}$ 4) none

15. The general solution of $\operatorname{cosec}^2 A+\frac{2}{\sqrt{3}}\operatorname{cosec}A\sec A=\sec^2 A$ is

1) $2n\pi+\frac{\pi}{3}$ 2) $n\pi+\frac{\pi}{3}$ or $n\pi-\frac{\pi}{6}$

3) $2n\pi-\frac{\pi}{6}$ 4) none

16. The general solution of $\cos 2\theta=\cos 5\theta$ is

1) $\frac{1}{7}n\pi$ or $\frac{1}{3}n\pi$ 2) $\frac{2}{7}n\pi$ or $\frac{1}{3}n\pi$

3) $\frac{2}{7}n\pi$ or $\frac{2}{3}n\pi$ 4) none

17. The generaol solution of $\tan m\theta+\cot n\theta=0$ is

1) $\frac{(2p+1)\pi}{2(m-n)}$ 2) $2p\pi+\frac{\pi}{2(m-n)}$

3) $\frac{(2p-1)\pi}{2(m-n)}$ 4) none

18. The general solution of $\sin\theta+\sin 5\theta=\sin 3\theta$ is

1) $\frac{n\pi}{6}$ or $n\pi\pm\frac{\pi}{3}$ 2) $\frac{n\pi}{3}$ or $n\pi\pm\frac{\pi}{6}$

3) $\frac{2n\pi}{3}$ or $(2n+1)\frac{\pi}{6}$ 4) none

19. The general solution of $\cos 9\theta=\cos 5\theta-\cos\theta$ is

1) $\frac{(4n\pm1)\pi}{10}$ or $\frac{(6n\pm1)\pi}{12}$

2) $\frac{(4n+1)\pi}{6}$ or $\frac{(4n-1)\pi}{5}$

3) $\frac{(2n\pm1)\pi}{10}$ or $\frac{(2n\pm1)\pi}{12}$ 4) None

20. The general solution of $\sin\theta+\sin 3\theta=\sin 5\theta+\sin 7\theta$ is

1) $\frac{\pi}{2}(4n\pm1)$ or $\frac{n\pi}{2}$ or $\frac{(4n\pm1)\pi}{8}$

2) $\frac{\pi}{2}(2n+1)$ 3) $\frac{(2n+1)\pi}{4}$

21. The general solution of $\sin 6A\cos 2A=\sin 5A\cos A$ is

1) $2n\pi$ or $\frac{(2n\pm\pi)}{7}$ 2) $n\pi$ or $\frac{(4n\pm1)\pi}{14}$

3) $\frac{(2n\pm1)\pi}{14}$ 4) none

22. The general solution of $\cos\theta+\sqrt{3}\sin\theta=1$ is

1) $(2n+1)\pi$ or $2n\pi-\frac{\pi}{3}$

2) $2n\pi+\frac{\pi}{3}$

3) $2n\pi$ or $2n\pi+\frac{2\pi}{3}$

4) none

23. The general solution of $\sqrt{3}\sin\theta-\cos\theta=\sqrt{2}$ is

1) $n\pi+\frac{\pi}{6}+(-1)^n\frac{\pi}{4}$ 2) $n\pi+\frac{\pi}{4}+(-1)^n\frac{\pi}{6}$

3) $2n\pi+\frac{\pi}{6}$ 4) none

24. The general solution of $\sin\theta-\cos\theta=\sqrt{2}$ is

1) $n\pi+\frac{3\pi}{4}$ 2) $2n\pi+\frac{3\pi}{4}$

3) $n\pi-\frac{3\pi}{4}$ 4) $2n\pi-\frac{3\pi}{4}$

25. The general solution of $\cos 2\theta=\sin\theta+\cos\theta$ is

1) $n\pi-\frac{\pi}{4}$ or $2n\pi$ or $2n\pi-\frac{\pi}{2}$

2) $n\pi+\frac{\pi}{4}$ or $2n\pi$ or $2n\pi+\frac{\pi}{2}$

3) $2n\pi+\frac{\pi}{4}$ or $n\pi$ or $2n\pi+\frac{\pi}{2}$ 4) none

26. The general solution of $2\cos\left(\frac{x}{2}\right)=\sqrt{3}$ is

1) $2n\pi\pm\frac{\pi}{6}$ 2) $4n\pi\pm\frac{\pi}{3}$

3) $4n\pi\pm\frac{2\pi}{3}$ 4) none

27. The general value of θ satisfying the equation $\sin 3\theta=\frac{\sqrt{3}}{2}$ is

1) $2n\pi\pm\frac{\pi}{3}$ 2) $n\pi\pm\frac{\pi}{3}$

3) $\frac{n\pi}{3}+(-1)^n\frac{\pi}{9}$ 4) none

28. The general solution of $\operatorname{cosec}^2 x=2$ is

1) $n\pi\pm\frac{\pi}{4}$ 2) $n\pi+(-1)^n\left(\frac{\pi}{4}\right)$

3) no solution 4) none

29. The general solution of $\cot\left(2x+\frac{\pi}{6}\right)=1$ is

1) $\frac{n\pi}{2}\pm\frac{\pi}{12}$ 2) $\frac{n\pi}{2}+\frac{\pi}{12}$

3) $\frac{n\pi}{2}\pm\frac{\pi}{24}$ 4) $\frac{n\pi}{2}+\frac{\pi}{24}$

30. The general solution of $\sin^2 x+\sin x-2=0$ is

1) $n\pi+(-1)^n\frac{\pi}{2}$ 2) $2n\pi\pm\frac{\pi}{2}$

3) $n\pi+\frac{\pi}{2}$ 4) none

31. The general solution of $\tan 4x\tan 6x=1$ is

1) $(2n\pm1)\frac{\pi}{20}$ 2) $(4n\pm1)\frac{\pi}{20}$

3) $(2n\pm1)\frac{\pi}{4}$ 4) none

32. The value of θ satisfying the equation $\cos\theta+\sqrt{3}\sin\theta=1$ is

1) $\frac{\pi}{3}$ 2) $\frac{5\pi}{3}$ 3) $\frac{2\pi}{3}$ 4) $\frac{4\pi}{3}$

33. The general value of θ satisfying $\tan^2(2\theta)=3$ is

1) $2n\pi\pm\frac{\pi}{3}$ 2) $n\pi\pm\frac{\pi}{3}$

3) $\frac{n\pi}{2}\pm\frac{\pi}{6}$ 4) none

34. The common general solution of equation $\tan\theta=\frac{-1}{\sqrt{3}}$ and $\sin\theta=\frac{-1}{2}$ is given by

1) $2n\pi\pm\frac{\pi}{6}$ 2) $n\pi+\frac{\pi}{6}$

3) $n\pi-\frac{\pi}{6}$ 4) $2n\pi-\frac{\pi}{6}$

35. The general solution of $\cos(3x+2)=\frac{1}{2}$ is

1) $2n\pi+\frac{(\pi-6)}{3}$ 2) $2n\pi\pm\frac{(\pi-6)}{9}$

3) no solution 4) none

36. The general value of x satisfying the equation $\sin^2 x\sec x+\sqrt{3}\tan x=0$ is

1) $n\pi+(-1)^{n+1}\frac{\pi}{3}$ 2) $n\pi$

3) $n\pi+(\pm1)^n\frac{\pi}{3}.n\pi$ 4) none

37. The general solution of $\sec x=-1$ is

1) $2n\pi\pm\pi$ 2) $2n\pi\pm\frac{\pi}{2}$

3) $2n\pi$ 4) none

38. The general solution of $\tan 2\theta.\tan\theta=1$ is given by

1) $n\pi-\frac{\pi}{6}$ 2) $(2n-1)\frac{\pi}{3}$

3) $n\pi+\frac{\pi}{4}$ 4) $(2n+1)\frac{\pi}{6}$

39. If $\sin 5x+\sin 3x+\sin x=0$, then the value of x other than 0 between 0 and $\frac{\pi}{2}$ is

1) $\frac{\pi}{12}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{4}$

40. All solution of $2\sin\theta+\tan\theta=0$ are obtained by taking all integral values of 'm' and 'n' are

1) $2n\pi+\frac{2\pi}{3}$ 2) $m\pi$ and $2n\pi\pm\frac{2\pi}{3}$

3) $n\pi$ and $m\pi\pm\frac{\pi}{3}$ 4) none

41. If $\tan(m\theta)=\tan(n\theta)$, then the different values of θ form

1) A.P 2) G.P 3) H.P 4) none

42. The values of x in the interval $0\le x\le\pi$, of the equation $2\sin^2 x+5\cos x-4=0$ are

1) 120^0 2) 60^0 3) 30^0 4) none

43. The value of θ satisfying $\tan^2\theta-\left(1+\sqrt{3}\right)\tan\theta+\sqrt{3}=0$ are

1) $n\pi+\frac{\pi}{3}, n\pi+\frac{\pi}{4}$ 2) $n\pi+\frac{\pi}{6}, n\pi+\frac{\pi}{4}$

3) $n\pi-\frac{\pi}{3}, n\pi+\frac{\pi}{4}$ 4) $n\pi-\frac{\pi}{6}, n\pi-\frac{\pi}{4}$

44. The general solution of $\tan^2 x+2\sqrt{3}\tan x=1$ is

1) $\frac{n\pi}{2}$ 2) $\frac{(2n+1)\pi}{2}$

3) $\frac{(12n+1)\pi}{12}$ 4) $\frac{n\pi}{12}$

45. The general solution of $\cos\theta=\cos 75^0+\cos 45^0$ is

1) $n\pi+\frac{\pi}{12}$ 2) $2n\pi\pm\frac{\pi}{6}$

3) $2n\pi\pm\frac{\pi}{12}$ 4) none

46. The general value of θ satisfying the two equations $\sin\theta = \frac{-1}{2}$ and $\cos\theta = \frac{-\sqrt{3}}{2}$ simultaneously will be

1) $2n\pi + \frac{7\pi}{6}$ 2) $n\pi + (-1)^n\left(\frac{-\pi}{6}\right)$

3) $2n\pi \pm \frac{5\pi}{6}$ 4) none

47. The equation $3\sin\theta + 4\cos\theta = k$ has real solution if

1) $|k| \le 3$ 2) $|k| \le 5$ 3) $|k| \le 4$ 4) none

48. The smallest positive root of the equation $\sqrt{1-\cos\theta} = \sin x$ is

1) $\frac{\pi}{2}$ 2) 2π 3) $\frac{\pi}{4}$ 4) none

49. The equation $\sin x + \cos x = 2$ has

1) only one solution 2) two solutions

3) no solution

4) infinite number of solutions

50. The general solution of $\tan\theta + \sec\theta = \sqrt{3}$ is

1) $2n\pi + \frac{\pi}{3}$ 2) $2n\pi \pm \frac{\pi}{3} - \frac{\pi}{6}$

3) $n\pi + \frac{\pi}{3} \pm \frac{\pi}{6}$ 4) none

PRACTICE SET - I KEY

1) 2	2) 3	3) 1	4) 2	5) 1
6) 2	7) 3	8) 2	9) 3	10) 1
11) 2	12) 3	13) 1	14) 1	15) 2
16) 3	17) 1	18) 2	19) 1	20) 1
21) 2	22) 3	23) 1	24) 2	25) 1
26) 2	27) 3	28) 1	29) 4	30) 1
31) 2	32) 3	33) 3	34) 4	35) 4
36) 2	37) 1	38) 4	39) 3	40) 2
41) 1	42) 2	43) 1	44) 3	45) 3
46) 1	47) 2	48) 1	49) 3	50) 2

PRACTICE SET - II

01. The general solution of $\cos\theta = \frac{1}{\sqrt{2}}$ is

1) $2n\pi \pm \frac{\pi}{4}$ 2) $n\pi \pm \frac{\pi}{4}$

3) $\frac{n\pi}{2} \pm \frac{\pi}{4}$ 4) none

02. If $\cot\theta = \sqrt{3}$, the general value of θ is

1) $n\pi - \frac{\pi}{6}$ 2) $n\pi + \frac{\pi}{6}$

3) $2n\pi + \frac{\pi}{6}$ 4) $2n\pi - \frac{\pi}{6}$

03. The general solution of the equation $2\sin^2\theta - 1 = 0$ is

1) $n\pi \pm \frac{\pi}{4}$ 2) $2n\pi \pm \frac{\pi}{4}$ 3) $\frac{n\pi}{2} \pm \frac{\pi}{3}$ 4) none

04. The general solution of $\tan^2 2\theta = \frac{1}{3}$ is

1) $\frac{n\pi}{2} \pm \frac{\pi}{12}$ 2) $n\pi \pm \frac{\pi}{6}$

3) $\frac{n\pi}{2} \pm \frac{\pi}{6}$ 4) none

05. The general solution of $\sin\theta \sec\theta = \sqrt{2}\sin\theta$ is

1) $2n\pi \pm \frac{\pi}{3}$ or $2n\pi$ 2) $n\pi \pm \frac{n\pi}{2}$ or $n\pi$

3) $2n\pi \pm \frac{\pi}{4}$ or $n\pi$ 4) none

06. The general solution of $3\left(\sec^2 A + \tan^2 A\right) = 5$ is

1) $2n\pi \pm \frac{\pi}{6}$ 2) $n\pi \pm \frac{\pi}{6}$

3) $n\pi \pm \frac{\pi}{3}$ 4) $2n\pi + \frac{\pi}{3}$

07. The general solution of $2\sin^2\theta = 1 + \cos\theta$ is

1) $2n\pi \pm \pi$ or $2n\pi \pm \frac{\pi}{6}$

2) $2n\pi \pm \pi$ or $2n\pi \pm \frac{\pi}{3}$

3) $n\pi \pm \pi$ or $n\pi \pm \frac{\pi}{3}$ 4) none

08. The general solution of $6\cos^2\theta + 5\sin\theta - 7 = 0$ is

1) $n\pi + (-1)^n \frac{\pi}{6}$ 2) $2n\pi + (-1)^n \frac{\pi}{6}$

3) $n\pi + (-1)^n \frac{\pi}{3}$ 4) $2n\pi + (-1)^n \frac{\pi}{3}$

09. The general solution of $\sin 2\theta = \sin\theta$ is

1) $n\pi$ or $\frac{n\pi}{3}$ 2) $2n\pi$ or $\frac{2n\pi}{3}$

3) $(2n+1)\pi$ or $\frac{n\pi}{6}$ 4) none

10. If $\cos\theta = \sin\theta$, then θ is

1) $2n\pi \pm \frac{\pi}{4}$ 2) $n\pi + \frac{\pi}{4}$ 3) $n\pi \pm \frac{\pi}{4}$ 4) none

11. The general solution of $\tan x + \tan 2x + \sqrt{3}\tan x \tan 2x = \sqrt{3}$ is

1) $\frac{n\pi}{3} + \frac{\pi}{2}$ 2) $\frac{n\pi}{3} + \frac{\pi}{6}$

3) $\frac{n\pi}{3} + \frac{\pi}{3}$ 4) $\frac{n\pi}{3} + \frac{\pi}{9}$

12. The values of θ, satisfying the equation $\cos\theta = \frac{-1}{\sqrt{2}}$ and $\tan\theta = 1$ will be given by

1) $2n\pi + \frac{3\pi}{4}$ 2) $2n\pi + \frac{5\pi}{4}$

3) $2n\pi + \frac{7\pi}{4}$ 4) none

13. The general solution of $3\cot^2 x = 1$ is

1) $n\pi + \frac{\pi}{3}$ 2) $n\pi + \tan^{-1}(3)$

3) $n\pi \pm \frac{\pi}{3}$ 4) none

14. The general solution of $\sin x - \cos x = \sqrt{2}$ is

1) $2n\pi - \frac{\pi}{4} + \pi$ 2) $(2n+1)\pi$

3) $2n\pi - \frac{\pi}{4}$ 4) none

15. If $\tan 3\theta = \cot\theta$, then $\theta =$

1) $\frac{(2n+1)\pi}{8}$ 2) $\frac{(2n+1)\pi}{4}$

3) $\frac{(2n+1)\pi}{6}$ 4) none

16. The general solution of $\tan 2\theta \tan\theta = 1$ is

1) $\frac{(2n+1)\pi}{3}$ 2) $\frac{(2n+1)\pi}{4}$

3) $\frac{(2n+1)\pi}{2}$ 4) $\frac{(2n+1)\pi}{6}$

PRACTICE SET - II KEY

1) 1	2) 2	3) 1	4) 1	5) 3
6) 2	7) 2	8) 1	9) 4	10) 2
11) 4	12) 2	13) 3	14) 1	15) 1
16) 4				

PREVIOUS EAMCET QUESTIONS

1. The most general value of θ satisfying with the equation $\sin\theta = \frac{1}{2}, \tan\theta = -\frac{1}{\sqrt{3}}$ is

1) $2n\pi + \frac{\pi}{6}$ 2) $2n\pi - \frac{7\pi}{6}$

3) $2n\pi + \frac{5\pi}{6}$ 4) none

02. If $\tan\alpha = \frac{m}{m+1}, \tan\beta = \frac{1}{2m+1}$ then $\alpha+\beta =$

1) $n\pi + \frac{\pi}{2}$ 2) $n\pi + \frac{\pi}{3}$

3) $n\pi - \frac{\pi}{4}$ 4) $n\pi + \frac{\pi}{4}$

03. The general solution of

$\sin^2 x - 2\cos x + \frac{1}{4} = 0$ is

1) $2n\pi \pm \frac{\pi}{2}$ 2) $n\pi \pm \frac{\pi}{2}$

3) $2n\pi \pm \frac{\pi}{3}$ 4) none

04. All values of 'x' satisfying

$\sin 2x + \sin 4x = 2\sin 3x$ are

1) $n\pi$ 2) $\frac{n\pi}{2}$ 3) $\frac{n\pi}{3}$ 4) $\frac{n\pi}{4}$

05. $3\tan(\theta - 15^0) = \tan(\theta + 15^0), 0 < \theta < \pi$, then $\theta = \ldots$

06. The value of $\theta \left(0 < \theta < 360^0\right)$ satisfying $\mathrm{cosec}\,\theta + 2 = 0$ are

1) $210^0, 300^0$ 2) $240^0, 300^0$

3) $210^0, 240^0$ 4) $210^0, 330^0$

07. If $\sqrt{3}\cos\theta - \sin\theta = 1$, then $\theta =$

1) π 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{6}$

08. The number of roots of the equation $2\sin^2\theta + 3\sin\theta + 1 = 0$ in $(0, 2\pi)$ is

1) 1 2) 2 3) 3 4) 0

09. If $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$ then $\theta =$

1) $\frac{n\pi + (-1)^n \pi}{4 + \frac{\pi}{6}}$ 2) $2n\pi \pm \frac{\pi}{4} + \frac{\pi}{6}$

3) $n\pi + \frac{\pi}{6}$ 4) $2n\pi \pm \frac{\pi}{6}$

10. If $\sqrt{\sin x} + \cos x = 0$ then $\sin x =$

1) $\frac{\sqrt{5}+1}{2}$ 2) $\frac{\sqrt{5}+1}{8}$ 3) $\frac{\sqrt{5}-1}{8}$ 4) $\frac{\sqrt{5}-1}{2}$

PREVIOUS EAMCET KEY

1) 1	2) 4	3) 3	4) 3	5) $\frac{\pi}{4}$
6) 4	7) 4	8) 3	9) 2	10) 4

SELF TEST

01. If $\tan\theta = 1$, the principal value of θ is

1) $\pi/4$ 2) $\pi/3$ 3) $\pi/6$ 4) none

02. The principal value of $\sin\theta = \sqrt{3}/2$

1) π 2) $\frac{2\pi}{3}$ 3) $\pi/3$ 4) $\pi/2$

03. The general solution of $\tan\theta + \sqrt{3} = 0$ is

1) $n\pi - \pi/3$ 2) $n\pi + (1)^n \pi/3$

3) $n\pi - (-1)^n \pi/3$ 4) none

04. General solution of equation $2\sin\theta - 1 = 0$ is

1) $n\pi + \pi/6$ 2) $n\pi - \pi/6$

3) $n\pi + (-1)^n \pi/6$ 4) none

05. General solution of $\sec\theta + \sqrt{2} = 0$ is

1) $2n\pi \pm 3\pi/4$ 2) $n\pi \pm 3\pi/4$

3) $n\pi + 3\pi/4$ 4) $2n\pi + 3\pi/4$

06. The general solution of $\tan^2\theta + \sec\theta = 1$ is

1) $2n\pi + \pi/3$ 2) $2n\pi$ or $n\pi \pm \pi/3$

3) $2n\pi$ or $2n\pi \pm 2\pi/3$ 4) none

07. The general solution of $\tan^2\theta = 3$

1) $n\pi + \pi/6$ 2) $n\pi - \pi/6$

3) $n\pi \pm \pi/6$ 4) none

08. The general solution of $\cos\theta = 1/\sqrt{2}$ is

1) $2n\pi \pm \pi/4$ 2) $n\pi \pm \pi/4$

3) $\frac{n\pi}{2} \pm \pi/4$ 4) none

09. The general solution of $\tan^2 2\theta = 1/3$ is

1) $\frac{n\pi}{2} \pm \frac{\pi}{12}$ 2) $n\pi \pm \pi/6$

3) $\frac{n\pi}{2} \pm \pi/6$ 4) none

10. $2\cos^2\theta = 1$, then $\theta =$

1) $30^0, 150^0$ 2) $45^0, 135^0$ 3) $60^0, 120^0$ 4) none

11. If $\tan 3\theta = \cot\theta$ then general solution

1) $n\pi + 1/2$ 2) $\frac{n\pi}{4} + \pi/8$

3) $2n\pi \pm \pi/8$ 4) none

12. The general solution of the equation $2\sin^2\theta - 1 = 0$ is

1) $n\pi \pm \pi/4$ 2) $2n\pi \pm \pi/4$

3) $\frac{n\pi}{2} \pm \pi/3$ 4) none

13. If $\cos\theta = \sin\theta$ then θ is

1) $2n\pi \pm \pi/4$ 2) $n\pi + \pi/4$

3) $n\pi$ 4) none

14. The general solution of $3\left[\sec^2\theta + \tan^2\theta\right] = 5$ is

1) $2n\pi \pm \pi/6$ 2) $n\pi \pm \pi/6$

3) $n\pi \pm \pi/3$ 4) none

15. If $\sin 2\theta = \sin\theta$ then the general solution is

1) $n\pi$ or $\frac{n\pi}{3}$ 2) $2n\pi$ or $2n\pi/3$

3) $(2n+1)\pi$ or $\frac{n\pi}{6}$ 4) none

SELF TEST KEY

1) 1	2) 3	3) 1	4) 3	5) 1
6) 3	7) 3	8) 1	9) 1	10) 2
11) 2	12) 1	13) 2	14) 2	15) 4

PUT YOUR FULL EFFORTS

DONOT WORRY ABOUT THE RESULT

THEY ARE BOUND TO COME TO YOU

INVERSE TRIGONOMETRIC FUNCTIONS

➡ Inverse of a function :

(i) $f: A \to B$ is bijective $\Leftrightarrow f^{-1}: B \to A$ exists and it is also bijective

(ii) All trigonometric functions are notbijective functions by restricting the domains of the functions, we make them bijective

➡ Domains and Ranges of Inverse trigonometric functions

Function	Domain	Range
$\sin^{-1}x$	$[-1,1]$	$\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
$\cos^{-1}x$	$[-1,1]$	$[0,\pi]$
$\tan^{-1}x$	R	$\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
$\cot^{-1}x$	R	$(0,\pi)$
$\sec^{-1}x$	$(-\infty,-1]\cup[1,\infty)$	$\left[0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\pi\right]$
$\operatorname{cosec}^{-1}x$		

◆ Properties of inverse trigonometric functions.

— $\sin^{-1}(\sin\theta)=\theta, \forall\theta\in[-\pi/2,\pi/2]$

◆ $\cos^{-1}(\cos\theta)=\theta \ \forall\ \theta\in[0,\pi]$

◆ $\tan^{-1}(\tan\theta)=\theta \ \forall\ \theta\in(-\pi/2,\pi/2)$

◆ $\operatorname{cosec}^{-1}(\operatorname{cosec}\theta)=\theta$ $\forall\ \theta\in[-\pi/2,\pi/2],\theta\neq 0$

◆ $\sec^{-1}(\sec\theta)=\theta \ \forall\ \theta\in[0,\pi],\theta\neq\pi/2$

◆ $\cot^{-1}(\cot\theta)=\theta \ \forall\ \theta\in(0,\pi)$

➡ ◆ $\sin(\sin^{-1}x)=x, \ \forall\ x\in[-1,1]$

◆ $\cos(\cos^{-1}x)=x, \ \forall\ x\in[-1,1]$

◆ $\tan(\tan^{-1}x)=x, \forall\ x\in R$

◆ $\operatorname{cosec}(\operatorname{cosec}^{-1}x)=x, \forall\ x\in(-\infty,-1]\cup[1,\infty)$

◆ $\sec(\sec^{-1}x)=x, \forall\ x\in(-\infty,-1]\cup[1,\infty)$

◆ $\cot(\cot^{-1}x)=x, \forall\ x\in R$

◆ $\sin^{-1}(-x)=-\sin^{-1}x, \forall\ x\in[-1,1]$

◆ $\cos^{-1}(-x)=\pi-\cos^{-1}x, \forall\ x\in[-1,1]$

◆ $\tan^{-1}(-x)=-\tan^{-1}x, \forall\ x\in R$

◆ $\operatorname{cosec}^{-1}(-x)=-\operatorname{cosec}^{-1}x, \forall$ $x\in R-(-1,1)$ (vi) $\cot^{-1}(-x)=\pi-\cot^{-1}x, \forall\ x\in R$

• $\sec^{-1}(-x)=\pi-\sec^{-1}x, \forall\ x\in(-\infty,-1]\cup[1,\infty)$

◆ $Sin^{-1}x=Cosec^{-1}\frac{1}{x}\forall x\in[-1,1], x\neq 0$

◆ $Cos^{-1}x=Sec^{-1}\frac{1}{x}, \forall x\in[-1,1], x\neq 0$

◆ $Tan^{-1}x=\begin{cases} Cot^{-1}\frac{1}{x}, \forall x>0 \\ -\pi+Cot^{-1}\frac{1}{x}, \forall x<0 \end{cases}$

◆ $\sin^{-1}x+\cos^{-1}x=\frac{\pi}{2}, \ \forall\ x\in[-1,1]$

◆ $\tan^{-1}x+\cot^{-1}x=\pi/2, \forall\ x\in R$

◆ $\sec^{-1}x+\operatorname{cosec}^{-1}x=\frac{\pi}{2}, \forall$ $x\in(-\infty,-1]\cup[1,\infty)$

➡ $Tan^{-1}x+Tan^{-1}y$

$$=\begin{cases} Tan^{-1}\left(\frac{x+y}{1-xy}\right) \text{if } x>0, y>0, xy<1 \\ \pi+Tan^{-1}\left(\frac{x+y}{1-xy}\right) \text{if } x>0, y>0, xy>1 \\ -\pi+Tan^{-1}\left(\frac{x+y}{1-xy}\right) \text{if } x<0, y<0, xy>1 \\ \frac{\pi}{2}, \text{if } xy=1 \end{cases}$$

$Tan^{-1}x-Tan^{-1}y=Tan^{-1}\left(\frac{x-y}{1+xy}\right)$ for $x>0, y>0$

➡ $\sin^{-1}x+\sin^{-1}y=\sin^{-1}\left\{x\sqrt{1-y^2}+y\sqrt{1-x^2}\right\}$

if $0\le x, y\le 1$ and $x^2+y^2\le 1$

$=\pi-\sin^{-1}\left\{x\sqrt{1-y^2}+y\sqrt{1-x^2}\right\}$, if $0<x, y\le 1$

and $x^2+y^2>1$

➡ $\sin^{-1}x-\sin^{-1}y=\sin^{-1}\left\{x\sqrt{1-y^2}-y\sqrt{1-x^2}\right\}$, if $0\le x, y\le 1$

➡ $\cos^{-1}y=\cos^{-1}\left\{xy-\sqrt{1-x^2}\sqrt{1-y^2}\right\}$,

if $0\le x, y\le 1$ and $x^2+y^2\ge 1$

$=\pi-\cos^{-1}\left\{xy-\sqrt{1-x^2}\sqrt{1-y^2}\right\}$, if $0\le x, y\le 1$

and $x^2+y^2<1$

➡ $\cos^{-1}x-\cos^{-1}y$

$=\cos^{-1}\left\{xy+\sqrt{1-x^2}\sqrt{1-y^2}\right\}$, if $0\le x, y\le 1$

➡ ◆ $2\sin^{-1}x=$

$\sin^{-1}\left(2x\sqrt{1-x^2}\right)$, if $-\frac{1}{\sqrt2}\le x\le\frac{1}{\sqrt2}$

$=\pi-\sin^{-1}\left(2x\sqrt{1-x^2}\right)$; if $\frac{1}{\sqrt2}\le x\le 1$

$=-\pi-\sin^{-1}\left(2x\sqrt{1-x^2}\right)$, if $-1\le x\le -\frac{1}{\sqrt2}$

◆ $2\cos^{-1}x=\cos^{-1}\left(2x^2-1\right)$, if $0\le x\le 1$

$=2\pi-\cos^{-1}\left(2x^2-1\right)$; if $-1\le x\le 0$

◆ $2\tan^{-1}x=\tan^{-1}\left(\frac{2x}{1-x^2}\right)$, if $-1<x<1$

$=\pi+\tan^{-1}\left(\frac{2x}{1-x^2}\right)$; if $x>1$

$=-\pi+\tan^{-1}\left(\frac{2x}{1-x^2}\right)$; is $x<-1$

◆ $2\tan^{-1}x=\sin^{-1}\left(\frac{2x}{1+x^2}\right)$; if $-1\le x\le 1$

$=\pi-\sin^{-1}\left(\frac{2x}{1+x^2}\right)$; if $x>1$

$=-\pi-\sin^{-1}\left(\frac{2x}{1+x^2}\right)$; if $x<-1$

◆ $2\tan^{-1}x=\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$; if $0\le x<\infty$

$=-\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$; if $-\infty<x\le 0$

◆ $3\sin^{-1}x=\sin^{-1}\left(3x-4x^3\right)$, if $-\frac{1}{2}\le x\le\frac{1}{2}$

$=\pi-\sin^{-1}\left(3x-4x^3\right)$, if $\frac{1}{2}<x\le 1$

$=-\pi-\sin^{-1}\left(3x-4x^3\right)$, if $-1\le x<-\frac{1}{2}$

◆ $3\cos^{-1}x=\cos^{-1}\left(4x^3-3x\right)$, if $1/2\le x\le 1$

$=2\pi-\cos^{-1}\left(4x^3-3x\right)$; if $-\frac{1}{2}\le x\le\frac{1}{2}$

$=2\pi+\cos^{-1}\left(4x^3-3x\right)$;

if $-1\le x\le -\frac{1}{2}$

◆ $3\tan^{-1}x = \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$, if $-\frac{1}{\sqrt{3}} < x < \frac{1}{\sqrt{3}}$

$= \pi + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$; if $x > \frac{1}{\sqrt{3}}$

$= -\pi + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$; if $x < -\frac{1}{\sqrt{3}}$

➡ $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \tan^{-1}\left(\frac{x+y+z-xyz}{1-xy-yz-zx}\right)$

➡ $Tan^{-1}x + Tan^{-1}y + Tan^{-1}z = \frac{\pi}{2}$, if $xy+yz+zx=1$

➡ $Tan^{-1}x + Tan^{-1}y + Tan^{-1}z = \pi$, if $x+y+z = xyz$

◆ $Tan^{-1}\frac{a}{x} + Tan^{-1}\frac{b}{x} = \frac{\pi}{2}$, then $x = \sqrt{ab}$

◆ $Sin^{-1}\frac{a}{x} + Sin^{-1}\frac{b}{x} = \frac{\pi}{2}$, then $x = \sqrt{a^2+b^2}$

◆ $Tan^{-1}\left(\frac{p}{q}\right) + Tan^{-1}\left[\frac{q-p}{q+p}\right] = \frac{\pi}{4}$

SOLVED EXAMPLES

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

Sol: Where $x = \frac{1}{2}, y = \frac{1}{3} \Rightarrow x > 0, y > 0$ and $xy < 1$

$\therefore \tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} = \tan^{-1}\frac{\frac{1}{2}+\frac{1}{3}}{1-\frac{1}{2}\cdot\frac{1}{3}}$

$\therefore \tan^{-1}(1) = \frac{\pi}{4}$

2. If $\tan^{-1}2$, $\tan^{-1}3$ are the angles of triangle then the third angle is

Sol: Where $x = 2, y = 3 \Rightarrow x > 0, y > 0$, and $xy > 1$

$\tan^{-1}2 + \tan^{-1}3 = \pi + \tan^{-1}\frac{2+3}{1-2.3}$

$= \pi + \tan^{-1}(-1) = \pi - \frac{\pi}{4} = \frac{3\pi}{4}$

$\therefore$ Third angle $= \pi - \left(\tan^{-1}2 + \tan^{-1}3\right)$

$= \pi - \frac{3\pi}{4} = \frac{\pi}{4}$

3. $\tan\left[\tan^{-1}1 + \tan^{-1}2 + \tan^{-1}3\right]$

Sol: $= \tan\left[\frac{\pi}{4} + \pi + \tan^{-1}\frac{2+3}{1-2.3}\right]$

$= \tan\left[\frac{\pi}{4} + \pi + \tan^{-1}-1\right]$

$= \tan\left[\frac{\pi}{4} + \pi - \frac{\pi}{4}\right] \quad = \tan\pi = 0$

4. Two angles of a triangle are $\cot^{-1}2$, and $\cot^{-1}3$ then the third angle is :

Sol : let $A = \cot^{-1}2, B = \cot^{-1}3$

$A + B = \cot^{-1}\frac{1}{2} + \cot^{-1}3$

$= \tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} \quad = \frac{\pi}{4}$

$\therefore\ c = \pi - \overline{A+B} = \pi - \frac{\pi}{4} - \frac{3\pi}{4}$

5. If $\sin^{-1}x + \sin^{-1}y = \theta$ then $\cos^{-1}x + \cos^{-1}y =$

Sol: We know that $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$

$\sin^{-1}y + \cos^{-1}y = \frac{\pi}{2}$

$\Rightarrow \sin^{-1}x + \sin^{-1}y + \cos^{-1}x + \cos^{-1}y = \pi$

$\Rightarrow \cos^{-1}x + \cos^{-1}y = \pi - \theta$

6. If $\cos^{-1}x + \cos^{-1}y = \frac{2\pi}{3}$ then $\sin^{-1}x + \sin^{-1}y =$

Sol: $\sin^{-1}x + \sin^{-1}y = \pi - \frac{2\pi}{3} = \frac{\pi}{3}$

7. $\tan^{-1}(\cot x) - \tan^{-1}(\cot 2x) = ...$

Sol: $\tan^{-1}(\cot x) - \tan^{-1}(\cot 2x)$

$= \tan^{-1}\left[\tan\left(\frac{\pi}{2} - x\right)\right] - \tan^{-1}\left[\tan\left(\frac{\pi}{2} - 2x\right)\right]$

$= \frac{\pi}{2} - x - \left(\frac{\pi}{2} - 2x\right) = x$

8. If $\sin^{-1}\frac{2a}{1+a^2} - \cos^{-1}\frac{1-b^2}{1+b^2} = \tan^{-1}\frac{2x}{1-x^2}$. Then $x = ...$

Sol: given equation reduces to

$2\tan^{-1}a - 2\tan^{-1}b = 2\tan^{-1}x$

$\tan^{-1}x = \tan^{-1}a - \tan^{-1}b$

$= \tan^{-1}\frac{a-b}{1+ab} \Rightarrow x = \frac{a-b}{1+ab}$

9. $\tan\left(\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right) = ...$

Sol : We know that $\tan\frac{\theta}{2} = \sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$

$\tan\left[\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right] = \left[\frac{1-\cos\left(\cos^{-1}\frac{\sqrt{5}}{3}\right)}{1+\cos\left(\cos^{-1}\frac{\sqrt{5}}{3}\right)}\right]^{\frac{1}{2}}$

$= \left[\frac{1-\frac{\sqrt{5}}{3}}{1+\frac{\sqrt{5}}{3}}\right]^{\frac{1}{2}} = \left[\frac{3-\sqrt{5}}{3+\sqrt{5}}\right]^{\frac{1}{2}}$

$= \sqrt{\frac{(3-\sqrt{5})^2}{4}} = \frac{3-\sqrt{5}}{2}$

10. $\sin\left(4\tan^{-1}\frac{1}{3}\right) =$

Sol : Put $\tan^{-1}\frac{1}{3} = \alpha \Rightarrow \tan\alpha = \frac{1}{3}$

$\therefore\ \sin 4\alpha = 2\sin 2\alpha.\cos 2\alpha$

$= 2.\frac{2\tan\alpha}{1+\tan^2\alpha}.\frac{1-\tan^2\alpha}{1+\tan^2\alpha}$

$= \frac{24}{25}$ where $\tan\alpha = 1/3$

11. $\sin^{-1}\left(2\cos^2 x - 1\right) + \cos^{-1}\left(1 - 2\sin^2 x\right) = ...$

Sol: $\sin^{-1}\left(2\cos^2 x - 1\right) + \cos^{-1}\left(1 - 2\sin^2 x\right)$

$= \sin^{-1}(\cos 2x) + \cos^{-1}(\cos 2x)$

$= \sin^{-1}\left[\sin\left(\frac{\pi}{2} - 2x\right)\right] + 2x = \frac{\pi}{2} - 2x + 2x = \frac{\pi}{2}$

12. $\cos^{-1}\left(\cos\frac{5\pi}{6}\right) = \frac{5\pi}{6}$, since $\frac{5\pi}{6} \in (0,\pi)$

13. $\tan^{-1}\left(\tan\frac{2\pi}{3}\right) = \tan^{-1}\left[\tan\left(\pi - \frac{\pi}{3}\right)\right]$

$= -\tan^{-1}\left(\tan\frac{\pi}{3}\right) = -\frac{\pi}{3}$

14. $\sin^{-1}\left(\sin\frac{6\pi}{7}\right) = \sin^{-1}\sin\left(\pi - \frac{\pi}{7}\right)$

$= \sin^{-1}\left(\sin\frac{\pi}{7}\right) = \frac{\pi}{7}$

15. If $\cot^{-1}\left(\frac{1+x}{1-x}\right) = \frac{1}{2}\cot^{-1}\left(\frac{1}{x}\right)$, then $x =$

Sol: $\cot^{-1}\left(\frac{1+x}{1-x}\right) = \frac{1}{2}\cot^{-1}\left(\frac{1}{x}\right)$

$\Rightarrow \tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1}x$

$\Rightarrow 2\tan^{-1}\left(\frac{1-x}{1+x}\right) = \tan^{-1}x$

$$\Rightarrow \frac{2\frac{1-x}{1+x}}{1-\left(\frac{1-x}{1+x}\right)^2}=x \Rightarrow \frac{2(1+x)(1-x)}{(1+x)^2-(1-x)^2}=x$$

$$\Rightarrow \frac{2-2x^2}{4x}=x \Rightarrow 1-x^2=2x^2$$

$$\Rightarrow 3x^2=1 \Rightarrow x=\pm\frac{1}{\sqrt{3}}$$

16. $\cos^{-1}(-1/2)=\pi-\cos^{-1}\frac{1}{2}=\pi-\frac{\pi}{3}=\frac{2\pi}{3}$

17. If $\sin^{-1}x+\sin^{-1}y=\frac{2\pi}{3}$, then $\cos^{-1}x+\cos^{-1}y=$

Sol: $\cos^{-1}x+\cos^{-1}y=\frac{\pi}{2}-\sin^{-1}x+\frac{\pi}{2}-\sin^{-1}y$

$=\pi-\left(\sin^{-1}x+\sin^{-1}y\right)=\pi-\frac{2\pi}{3}=\frac{\pi}{3}$

18. If $\sec^{-1}\left(\frac{a+b}{a-b}\right)=2\tan^{-1}x$, then $x=$

Sol: $\sec^{-1}\left(\frac{a+b}{a-b}\right)=\tan^{-1}\frac{2x}{1-x^2}$

$$\Rightarrow \sec^{-1}\left(\frac{1+\frac{b}{a}}{1-\frac{b}{a}}\right)=\sec^{-1}\left(\frac{1+x^2}{1-x^2}\right)$$

$$\Rightarrow x^2=\frac{b}{a} \Rightarrow x=\sqrt{\frac{b}{a}}$$

19. $4\sin^{-1}x+\cos^{-1}x=\frac{3\pi}{2}$, then x =

Sol: $3\sin^{-1}x+\sin^{-1}x+\cos^{-1}x=\frac{3\pi}{2}$

$$\Rightarrow 3\sin^{-1}x+\frac{\pi}{2}=\frac{3\pi}{2}$$

$$\Rightarrow 3\sin^{-1}x=\frac{3\pi}{2}-\frac{\pi}{2}$$

$$\Rightarrow 3\sin^{-1}x=\pi \Rightarrow \sin^{-1}x=\frac{\pi}{3}$$

$$\Rightarrow x=\sin\frac{\pi}{3}=\frac{\sqrt{3}}{2}.$$

20. If $\cos^{-1}\frac{3}{5}-\sin^{-1}\frac{4}{5}=\cos^{-1}x$, then x =

Sol: $\cos^{-1}\frac{3}{5}-\sin^{-1}\frac{4}{5} \Rightarrow \cos^{-1}\frac{3}{5}-\sin^{-1}\frac{4}{5}=0$

From the given equation we get

$\cos^{-1}x=0 \Rightarrow x=\cos\theta=1$

21. If $\sin^{-1}\frac{5}{x}+\sin^{-1}\frac{2}{x}=\frac{\pi}{2}$, then $x=$

Sol: $x=\sqrt{a^2+b^2}=\sqrt{25+4}=\sqrt{29}$

22. $\sec^2\left(\tan^{-1}2\right)+\operatorname{cosec}^2\left(\cot^{-1}2\right)=$

Sol: Let $A=\tan^{-1}2$

$\Rightarrow \tan A=2 \Rightarrow \sec A=\sqrt{1+4}=\sqrt{5}$

$B=\cot^{-1}2 \Rightarrow \cot B=2 \Rightarrow \operatorname{cosec}B=\sqrt{1+4}=\sqrt{5}$

$\sec^2\left(\tan^{-1}2\right)+\operatorname{cosec}^2\left(\cot^{-1}2\right)$

$\sec^2 A+\operatorname{cosec}^2 B \;=\left(\sqrt{5}\right)^2+\left(\sqrt{5}\right)^2=10$

23. For $0\le\cos^{-1}x\le\pi$ and $-\frac{\pi}{2}\le\sin^{-1}x\le\frac{\pi}{2}$, then $\cos\left(\sin^{-1}x+2\cos^{-1}x\right)=....$

Sol: $\cos\left[\sin^{-1}x+2\cos^{-1}x\right]$

$=\cos\left[\sin^{-1}x+\cos^{-1}x+\cos^{-1}x\right]$

$=\cos\left[\frac{\pi}{2}+\cos^{-1}x\right]=-\sin\left[\cos^{-1}x\right]$

$=-\sin\left[\cos^{-1}\frac{1}{5}\right]=-\sin\left[\sin^{-1}\frac{\sqrt{24}}{5}\right]$

$=\frac{-\sqrt{24}}{5}$

24. Range of $\sin^{-1}x+\cos^{-1}x+\tan^{-1}x$ is

Sol: Let $y=\sin^{-1}x+\cos^{-1}x+\tan^{-1}x=\frac{\pi}{2}+\tan^{-1}x$

since $-\frac{\pi}{2}<\tan^{-1}x<\frac{\pi}{2}$

$\Rightarrow \frac{\pi}{2}-\frac{\pi}{2}<\frac{\pi}{2}+\tan^{-1}x<\pi \quad \Rightarrow 0<y<\pi$

$\therefore$ Range of $y=(0,\pi)$

25. $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right)=..$

Sol: $=2\sec 2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)=2\sec\left(\cos^{-1}\frac{a}{b}\right)$

$=2\sec\left(\sec^{-1}\frac{b}{a}\right)=\frac{2b}{a}$

PRACTICE SET - I

01. The principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is
1) $\frac{2\pi}{3}$ 2) $-\frac{2\pi}{3}$ 3) $\frac{\pi}{3}$ 4) $\frac{4\pi}{3}$

02. The value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$ is
1) $\frac{7\pi}{6}$ 2) $\frac{5\pi}{3}$ 3) $\frac{5\pi}{6}$ 4) $\frac{13\pi}{6}$

03. The value of $\cos(2\cos^{-1}0.8)$ is
1) 0.48 2) 0.96 3) 0.6 4) 0.28

04. The value of $\sin^{-1}(\sin 10)$ is
1) 10 2) $10-3\pi$ 3) $3\pi-10$ 4) -10

05. The value of $\tan\left(\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right)$ is
1) $\frac{3+\sqrt{5}}{2}$ 2) $3+\sqrt{5}$
3) $\frac{1}{2}\left(3-\sqrt{5}\right)$ 4) $2-\sqrt{3}$

06. The value of $\tan\left(\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{2}{3}\right)$
1) $\frac{6}{17}$ 2) $\frac{7}{17}$ 3) $\frac{17}{6}$ 4) $\frac{4}{17}$

07. The value of $\sin^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right)$ is
1) $\frac{3\pi}{5}$ 2) $\frac{7\pi}{5}$ 3) $\frac{\pi}{10}$ 4) $-\frac{\pi}{10}$

08. The value of $\sin(\cot^{-1}x)$
1) $\frac{1}{1+x^2}$ 2) $\frac{1}{\sqrt{1+x^2}}$ 3) $\frac{x}{\sqrt{1+x^2}}$ 4) $\frac{x}{1+x^2}$

09. $\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)$ is equal to
1) $\frac{\pi}{4}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{3}$ 4) $\frac{2\pi}{3}$

10. $\cos^{-1}\left(\frac{15}{17}\right)+2\tan^{-1}\left(\frac{1}{5}\right)$
1) $\frac{\pi}{2}$ 2) $\cos^{-1}\left(\frac{171}{221}\right)$
3) $\frac{\pi}{4}$ 4) $\tan^{-1}\left(\frac{171}{140}\right)$

11. $2\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{7}\right)$
1) $\tan^{-1}\left(\frac{49}{29}\right)$ 2) $\frac{\pi}{2}$ 3) 0 4) $\frac{\pi}{4}$

12. If $\sin^{-1}\frac{x}{5}+\operatorname{cosec}^{-1}\left(\frac{5}{4}\right)=\frac{\pi}{2}$, then x=
1) 4 2) 5 3) 1 4) 3

13. $\sin^{-1}\left(\frac{3}{5}\right)+\tan^{-1}\left(\frac{1}{7}\right)=$
1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ 3) $\cos^{-1}\left(\frac{4}{5}\right)$ 4) $\frac{\pi}{3}$

14. $\cot\left(\cos^{-1}\left(\frac{7}{25}\right)\right)=$

1) $\frac{25}{24}$ 2) $\frac{25}{7}$ 3) $\frac{24}{25}$ 4) $\frac{7}{24}$

15. $\cos^{-1}\left(\cos\left(\frac{5\pi}{4}\right)\right)=$

1) $\frac{5\pi}{4}$ 2) $\frac{3\pi}{4}$ 3) $-\frac{\pi}{4}$ 4) $\frac{-5\pi}{4}$

16. $Tan^{-1}\frac{1}{3}+Tan^{-1}\frac{1}{7}+.....+Tan^{-1}\frac{1}{n^2+n+1}=$

1) $Tan^{-1}\left(\frac{2n-1}{n+2}\right)$ 2) $Tan^{-1}\left(\frac{2n}{n+5}\right)$

3) $Tan^{-1}\left(\frac{1}{n+2}\right)$ 4) $Tan^{-1}\left(\frac{n}{n+2}\right)$

17. If $\sin^{-1}x+\sin^{-1}y=\frac{2\pi}{3}$, then $\cos^{-1}x+\cos^{-1}y=$

1) $\frac{2\pi}{3}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) π

18. $\tan^{-1}\left(\frac{1}{4}\right)+\tan^{-1}\left(\frac{2}{9}\right)=$

1) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ 2) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$

3) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ 4) $\tan^{-1}\left(\frac{1}{2}\right)$

19. $\tan^{-1}\left(\frac{x}{y}\right)-\tan^{-1}\left(\frac{x-y}{x+y}\right)$ is

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{4}$ or $-\frac{3\pi}{4}$

20. The domain of $\sin^{-1}x$ is

1) $(-\pi,\pi)$ 2) $[-1,1]$ 3) $(0,2\pi)$ 4) $(-\infty,\infty)$

21. The principal value of $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ is

1) $\frac{-2\pi}{3}$ 2) $\frac{-\pi}{3}$ 3) $\frac{4\pi}{3}$ 4) $\frac{5\pi}{3}$

22. The value of $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{3}$ is

1) 0 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) $\frac{\pi}{4}$

23. If $A=\tan^{-1}x$, then the value $\sin 2A$ is

1) $\frac{2x}{1-x^2}$ 2) $\frac{2x}{\sqrt{1-x^2}}$ 3) $\frac{2x}{1+x^2}$ 4) $\frac{1+x^2}{2x}$

24. The value of $\sin\left(\cot^{-1}\left(\cos\left(\tan^{-1}x\right)\right)\right)$ is

1) $\sqrt{\frac{x^2+2}{x^2+1}}$ 2) $\sqrt{\frac{x^2+1}{x^2+2}}$ 3) $\frac{x}{\sqrt{x^2+2}}$ 4) $\frac{1}{\sqrt{x^2+2}}$

25. If $\sin^{-1}\left(\frac{2a}{1+a^2}\right)+\sin^{-1}\left(\frac{2b}{1+b^2}\right)=2\tan^{-1}x$, then x is equal to

1) $\frac{a-b}{1+ab}$ 2) $\frac{b}{1+ab}$ 3) $\frac{b}{1-ab}$ 4) $\frac{a+b}{1-ab}$

26. The value of $\tan^{-1}1+\tan^{-1}2+\tan^{-1}3$ is

1) 0 2) 1 3) π 4) $-\pi$

27. If $3Sin^{-1}\left(\frac{2x}{1+x^2}\right)-4Cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+2Tan^{-1}\left(\frac{2x}{1-x^2}\right)=\frac{\pi}{3}$ then x =

1) $\frac{1}{\sqrt{3}}$ 2) $\frac{1}{2}$ 3) 1 4) $\sqrt{3}$.

28. If $Sin^{-1}x-Cos^{-1}x=Sin^{-1}(3x-2)$, then x =

1) $1,\frac{1}{2}$ 2) 1,0 3) $0,\frac{1}{2}$ 4) $1,-\frac{1}{2}$

29. If $Sin^{-1}x+Sin^{-1}y+Sin^{-1}z=\frac{\pi}{2}$, then $x^2+y^2+z^2+2xyz=$

1) 0 2) 1 3) xyz 4) 2xyz

30. If $Cos^{-1}\frac{x}{2}+Cos^{-1}\frac{y}{3}=\theta$, then $9x^2-12xyCos\theta+4y^2=$

1) $36Sin^2\theta$ 2) $9Sin^2\theta$

3) $Sin^2\theta$ 4) $3Sin^2\theta$

31. If $Tan^{-1}\left(\frac{x+1}{x-1}\right)+Tan^{-1}\left(\frac{x-1}{x}\right)=\pi+Tan^{-1}(-7)$, then x =

1) 2 2) -2

3) 1 4) No solution

32. If $3Tan^{-1}\left(\frac{1}{2+\sqrt{3}}\right)-Tan^{-1}\frac{1}{x}=Tan^{-1}\left(\frac{1}{3}\right)$, then x =

1) 2 2) -2

3) 1 4) No solution

33. $Sec^2\left(Cot^{-1}\frac{1}{2}\right)+Cosec^2\left(Tan^{-1}\frac{1}{3}\right)=$

1) 13/36 2) 15 3) 13 4) 36

34. If $\theta=Sin^{-1}x+Cos^{-1}x-Tan^{-1}x, 0\le x\le 1$, then the smallest interval in which θ lies is given by

1) $\frac{\pi}{4}\le\theta\le\frac{\pi}{2}$ 2) $-\frac{\pi}{4}\le\theta\le 0$

3) $0\le\theta\le\frac{\pi}{4}$ 4) $\frac{\pi}{2}\le\theta\le\frac{3\pi}{4}$

PRACTICE SET - I KEY

1) 3	2) 3	3) 4	4) 3	5) 3
6) 3	7) 4	8) 2	9) 4	10) 4
11) 4	12) 4	13) 1	14) 4	15) 2
16) 4	17) 2	18) 4	19) 3	20) 2
21) 2	22) 4	23) 3	24) 2	25) 4
26) 3	27) 1	28) 1	29) 2	30) 1
31) 1	32) 1	33) 2	34) 1	

PRACTICE SET - II

1. $\cot^{-1}x+\cot^{-1}y+\cot^{-1}z=\pi/4$ then $xy+yz+zx+x+y+z=$

1) 1-xyz 2) -1-xyz 3) 1+xyz 4) -1+xyz

2. $\cos^{-1}x+\cos^{-1}y=2\pi$ then the value of $\sin^{-1}x+\sin^{-1}y=$

1) 0 2) π 3) $-\pi$ 4) 2π

3. If $\tan^{-1}\left(\frac{3a^2x-x^3}{a^3-3ax^2}\right)=k\tan^{-1}(x/a)$ then k =

1) 2 2) 3 3) -2 4) 4s

4. Which of the following statements is correct:

I : $Tan^{-1}2+Tan^{-1}3=\frac{3\pi}{4}$

II : $\cos^{-1}\left\{\left(\frac{-1}{7}\right)+\sin^{-1}\left(\frac{-1}{7}\right)\right\}=0$

1) only I 2) Only II

3) both I & II 4) Neither I nor II

PRACTICE SET - II KEY

1) 3	2) 3	3) 2	4) 2

PREVIOUS EAMCET QUESTIONS

01. $\left(Sin\left(Tan^{-1}\frac{3}{4}\right)\right)^2=$ (1981)

1) 3/25 2) 9/25 3) 16/25 4) None

02. $Cos^{-1}\left(\frac{15}{17}\right)+2Tan^{-1}\left(\frac{1}{5}\right)=$ (1982)

1) $\frac{\pi}{2}$ 2) $Sin^{-1}\frac{171}{221}$

3) $\frac{\pi}{6}$ 4) none

03. If $Sin^{-1}\frac{x}{5}+Cosec^{-1}\left(\frac{5}{4}\right)=\frac{\pi}{2}$, then x = (1983)

1) 4   2) 5   3) 1   4) 3

04. Principle values along being considered the value of $2Tan^{-1}\frac{1}{3}+Tan^{-1}\frac{1}{7}=$ (1983)

1) $Tan^{-1}\frac{49}{29}$ 2) $\frac{\pi}{2}$ 3) 0   4) $\frac{\pi}{4}$

05. $Sin^{-1}\left(\frac{3}{5}\right)+Sin^{-1}\left(\frac{5}{13}\right)=Sin^{-1}x$ then x=..... (1987)

1) $\frac{51}{65}$ 2) $\frac{52}{65}$ 3) $\frac{56}{65}$ 4) none

06. $Sin\left(Sin^{-1}x+Cos^{-1}x\right)=$ (1984)

1) 2   2) 1   3) 0   4) 4

07. $Sin\left(Sin^{-1}\frac{1}{2}+Cos^{-1}\frac{1}{2}\right)=$ (1985)

1) 1   2) 2   3) 3   4) 4

08. If $Tan^{-1}\frac{1}{7}=\alpha, Tan^{-1}\frac{1}{3}=\beta$ then $Cos2\alpha$ = (1986)

1) $Sin2\beta$ 2) $Sin4\beta$ 3) $Sin3\beta$ 4) None

10. The solution of (1989)

$Sin^{-1}\left(\frac{2a}{1+a^2}\right)-Cos^{-1}\left(\frac{1-b^2}{1+b^2}\right)=Tan^{-1}\left(\frac{2x}{1-x^2}\right)$ is

1) $\frac{a+b}{1-ab}$ 2) $\frac{a-b}{1+ab}$ 3) $\frac{ab-1}{a+b}$ 4) $\frac{ab+1}{a-b}$

11. $Cot\left(\frac{\pi}{4}-2Cot^{-1}3\right)=$ (1992)

1) 3   2) 5   3) 7   4) 9

12. $Tan^{-1}\left(\frac{x}{y}\right)-Tan^{-1}\left(\frac{x-y}{x+y}\right)=$ (1992)

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{4}$ 4) $-\frac{3\pi}{4}$

13. $Tan^{-1}\left(\frac{1}{4}\right)+Tan^{-1}\left(\frac{2}{9}\right)=$ (1994)

1) $\frac{\pi}{4}$ 2) $Tan^{-1}\left(\frac{1}{2}\right)$ 3) $2Tan^{-1}\left(\frac{3}{5}\right)$ 4) $-\frac{\pi}{4}$

14. $Sin^{-1}x+Sin^{-1}y=\frac{2\pi}{3}$, then $Cos^{-1}x+Cos^{-1}y=$ (1994)

1) $\frac{2\pi}{3}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) π

15. The domain of $Sin^{-1}x$ (1995)

1) [0,5]   2) [-1,1]   3) $(-\infty,\infty)$ 4) (-1,1)

16. If a,b,c are +ve then (1996)

$Tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}}+Tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}}+Tan^{-1}\sqrt{\frac{c(a+b+c)}{ab}}=$

1) 0   2) π 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{4}$

17. If $Tan^{-1}(x+1)+Tan^{-1}(x-1)=Tan^{-1}\left(\frac{8}{31}\right)$, then x = (1996)

1) 2   2) ½   3) -1/2   4) ¼

18. $Tan^{-1}(1+x)+Tan^{-1}(1-x)=\frac{\pi}{4}$, then x = (1996)

1) 2   2) ±2   3) $\sqrt{2}$ 4) $\pm\sqrt{2}$

19. $Cos^{-1}\frac{3}{5}-Sin^{-1}\frac{4}{5}=Cos^{-1}x$, then x = (1997)

1) -1   2) 1   3) 0   4) $\pi/2$

20. $Tan\left(\frac{1}{2}Cos^{-1}0\right)=$ (1997)

1) 0   2) -1   3) 1   4) 1/2

21. If $Tan^{-1}x+Tan^{-1}y+Tan^{-1}z=\frac{\pi}{2}$, then 1-xy-yz-zx = (1998)

1) 1   2) 0   3) -1   4) 2

22. $Tan^{-1}\frac{1}{2}+Tan^{-1}\frac{1}{3}=$ (1999)

1) $\pi/2$ 2) $\pi/4$ 3) $\pi/3$ 4) $\pi/6$

23. If $Tan^{-1}3+Tan^{-1}x=Tan^{-1}8$, then x = (2000)

1) 5   2) 1/5   3) 5/14   4) 14/5

24. $Sec^2\left(Tan^{-1}2\right)+Cosec^2\left(Cot^{-1}3\right)=$ (2001)

1) 5   2) 10   3) 15   4) 20

25. If $Sin^{-1}x-Cos^{-1}x=\frac{\pi}{6}\Rightarrow x=$ (2002)

1) $\frac{1}{2}$ 2) $\frac{\sqrt{3}}{2}$ 3) $-\frac{1}{2}$ 4) $-\frac{\sqrt{3}}{2}$

26. $Cos\left(cos^{-1}\left(-\frac{1}{7}\right)+Sin^{-1}\left(-\frac{1}{7}\right)\right)=$ (2003)

1) $-\frac{1}{3}$ 2) 0   3) $\frac{1}{3}$ 4) $\frac{4}{9}$

27. $Sin^{-1}x+Sin^{-1}(1-x)=Cos^{-1}x\Rightarrow x\in$ (2004)

1) (1,0)   2) (-1,1)   3) $\left\{0,\frac{1}{2}\right\}$ 4) (-2,0)

27A. $Sin^{-1}\frac{4}{5}+2Tan^{-1}\frac{1}{3}=$

1) $\pi/3$ 2) $\pi/4$ 3) $\pi/2$ 4) 0

OTHER ENTRANCE EXAM QUESTIONS

28 If $Cos^{-1}\sqrt{p}+Cos^{-1}\sqrt{1-p}+Cos^{-1}\sqrt{1-q}=\frac{3\pi}{4}$, then the value of q is

1) $\frac{1}{\sqrt{2}}$ 2) 1   3) $\frac{1}{2}$ 4) $\frac{1}{3}$

29 If $Tan^{-1}\left(\frac{x+1}{x-1}\right)+Tan^{-1}\left(\frac{x-1}{x}\right)=\pi+Tan^{-1}(-7)$, then the value of x is

1) 0   2) -2   3) 1   4) 2

30. The value of $Sin^{-1}\frac{3}{5}+Tan^{-1}\frac{1}{7}$ is equal to

1) π 2) $\pi/2$ 3) $\pi/4$ 4) $\pi/8$

31. The value of $Tan\left(\frac{1}{2}Cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right)=$

1) $\frac{2}{5-\sqrt{5}}$ 2) $\frac{2}{5+\sqrt{5}}$ 3) $\frac{3+\sqrt{5}}{2}$ 4) $\frac{3-\sqrt{5}}{2}$

32. $Sin\left(\frac{1}{2}Cot^{-1}\left(-\frac{3}{4}\right)\right)=$

1) $\frac{1}{\sqrt{5}}$ 2) $\frac{2}{\sqrt{5}}$ 3) $-\frac{2}{\sqrt{5}}$ 4) $-\frac{1}{\sqrt{5}}$

33. $3Tan^{-1}\left(\frac{1}{2+\sqrt{3}}\right)-Tan^{-1}\left(\frac{1}{x}\right)=Tan^{-1}\left(\frac{1}{3}\right)$, then x =

1) 1   2) 3   3) 2   4) $\sqrt{3}$

34. If $Sin^{-1}\left(\frac{2a}{1+a^2}\right)+Sin^{-1}\left(\frac{2b}{1+b^2}\right)=2Tan^{-1}x$, then x =

1) $\frac{a-b}{1+ab}$ 2) $\frac{b}{1+ab}$ 3) $\frac{b}{1-ab}$ 4) $\frac{a+b}{1-ab}$

35. The value of $Cos\left(Sin^{-1}x\right)$ is

1) $\frac{\pi}{2}-x$ 2) $\sqrt{1-x^2}$ 3) $-\sqrt{1-x^2}$ 4) $\sqrt{1+x^2}$

36. If $4Cos^{-1}x+Sin^{-1}x=\pi$, then the value of x is

1) $\frac{1}{2}$ 2) $\frac{1}{\sqrt{2}}$ 3) $\frac{\sqrt{3}}{2}$ 4) $\frac{2}{3}$

37. $3Sin^{-1}\frac{2x}{1+x^2}-4Cos^{-1}\frac{1-x^2}{1+x^2}+2Tan^{-1}\frac{2x}{1+x^2}=\frac{\pi}{3}$, then x =

1) $\frac{1}{\sqrt{3}}$ 2) $-\frac{1}{\sqrt{3}}$ 3) $\sqrt{3}$ 4) $-\frac{\sqrt{3}}{4}$

38. The domain of $Sin^{-1}\frac{2x+1}{3}$ is

1) (-2,1)   2) [-2,1]   3) $\Re$ 4) [-1,1]

39. If $4Sin^{-1}x+Cos^{-1}x=\pi$, then x =

1) 0   2) $\frac{1}{2}$ 3) $\frac{\sqrt{3}}{2}$ 4) $\frac{1}{\sqrt{2}}$

40. If $Sin^{-1}\left(x-\frac{x^2}{2}+\frac{x^3}{4}-...\right)+Cos^{-1}\left(x^2-\frac{x^4}{2}+\frac{x^6}{4}-...\right)=\frac{\pi}{2}$ for $0<|x|<\sqrt{2}$, then x =

1) ½ 2) 1 3) -1/2 4) -1

41. The number of real solutions of $Tan^{-1}\sqrt{x(x+1)}+Sin^{-1}\sqrt{x^2+x+1}=\frac{\pi}{2}$

1) 0 2) 1 3) 2 4) infinite

PREVIOUS QS KEY

1) 2	2) 2	3) 4	4) 4	5) 3
6) 2	7) 1	8) 2	9) 3	10) 2
11) 3	12) 3	13) 2	14) 2	15) 2
16) 2	17) 4	18) 4	19) 2	20) 3
21) 2	22) 2	23) 2	24) 3	25) 2
26) 2	27) 3	27A) 3	28) 3	29) 4
30) 3	31) 4	32) 2	33) 3	34) 4
35) 2	36) 3	37) 1	38) 2	39) 2
40) 2	41) 3			

SELF TEST

01. The value of $\tan^{-1}\left(\tan\frac{11\pi}{4}\right)$ is

1) $\frac{\pi}{4}$ 2) $-\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) None

02. The solution of the equation $cosec^{-1}x+\cos^{-1}\frac{1}{3}=\frac{\pi}{2}$ is

1) 1 2) 2 3) 3 4) None

03. The value of $2\tan^{-1}2$ is

1) $-\tan^{-1}\left(\frac{4}{3}\right)$ 2) $\frac{\pi}{2}+\tan^{-1}\left(\frac{4}{3}\right)$

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

04. The value of $\tan^{-1}\left(\frac{1-\tan\frac{\pi}{5}}{1+\tan\frac{\pi}{5}}\right)=$

1) π 2) $\pi/4$ 3) $\pi/20$ 4) None

05. $\cos^{-1}\left[\cos\left(600^0\right)\right]=$

1) 60^0 2) 120^0 3) -60^0 4) none

06. $\sin^{-1}\left(\frac{3}{5}\right)+\sin^{-1}\left(\frac{15}{17}\right)=$

1) $\sin^{-1}\left(\frac{84}{85}\right)$ 2) $\cos^{-1}\left(\frac{13}{85}\right)$

3) $\pi-\sin^{-1}\left(\frac{84}{85}\right)$ 4) none

07. If $\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{5}\right)+\tan^{-1}\left(\frac{1}{7}\right)=\tan^{-1}(x)$, then x =

1) $\frac{1}{9}$ 2) $\frac{7}{9}$ 3) 1 4) ∞

08. If $\sin^{-1}x+\sec^{-1}\frac{15}{4}=\frac{\pi}{2}$ then x =

1) 15/4 2) 2/5 3) 4/15 4) None

09. $\sec\left[\sin^{-1}\left(\frac{-5}{13}\right)\right]=$

1) $\frac{5}{12}$ 2) $\frac{12}{5}$ 3) $\frac{-13}{12}$ 4) $\frac{13}{12}$

10. $\sin\left[\tan^{-1}(x)\right]$ where $x<0$ will be

1) $\frac{-x}{\sqrt{1+x^2}}$ 2) $\frac{1}{\sqrt{1+x^2}}$ 3) $\sqrt{1+x^2}$ 4) $\frac{x}{\sqrt{1+x^2}}$

11. $\tan^{-1}\left[\tan\left(700^0\right)\right]=$

1) 20^0 23) -20^0 3) 160^0 4) none

12. $\sin^{-1}(x)=$

1) $\frac{\pi}{2}+\cos^{-1}(x)$ 2) $\cos^{-1}\left(\sqrt{1-x^2}\right)$

3) $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ 4) None

13. If $\cos^{-1}\left(\frac{-1}{2}\right)=\sin^{-1}(x)$ then x =

1) $\frac{-\sqrt{3}}{2}$ 2) $\frac{\sqrt{3}}{2}$ 3) $\frac{1}{2}$ 4) does not exist

14. $\cos^{-1}\left[-\cos\left(\frac{3\pi}{4}\right)\right]=$

1) $\frac{3\pi}{4}$ 2) $\frac{-\pi}{4}$ 3) $\frac{\pi}{4}$ 4) none

15. $\cos\left[-2\sin^{-1}\left(\frac{3}{5}\right)\right]=$

1) $\frac{7}{25}$ 2) $\frac{24}{25}$ 3) $\frac{18}{25}$ 4) $\frac{-7}{25}$

16. $\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{1}{5}\right)+\tan^{-1}\left(\frac{1}{8}\right)=$

1) π 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

17. $\cot^{-1}\left(\frac{1}{2}\right)+\cot^{-1}\left(\frac{1}{3}\right)=$

1) $-\frac{\pi}{4}$ 2) $\frac{3\pi}{4}$ 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{3}$

18. If $\tan^{-1}(x)+\tan^{-1}(y)+\tan^{-1}(z)=\pi$ then xyz =

1) 1 2) $xy+yz+zx$

3) $x+y+z$ 4) $x+y+z+2$

19. If $\tan^{-1}(x)+\tan^{-1}(y)+\tan^{-1}(z)=\frac{\pi}{2}$ then $xy+yz+zx=$

1) 1 2) $x+y+z$ 3) xyz 4) none

20. $\cos^{-1}\left[\sin\left(\frac{2\pi}{3}\right)\right]=$

1) $\pi/6$ 2) $\pi/4$ 3) $\pi/3$ 4) $\pi/2$

SELF TEST KEY

1) 2	2) 3	3) 1	4) 3	5) 2
6) 1	7) 2	8) 3	9) 4	10) 1
11) 2	12) 2	13) 2	14) 3	15) 1
16) 4	17) 2	18) 3	19) 1	20) 3

SPACE FOR IMPORTANT NOTES

PROPERTIES OF TRIANGLES

SYNOPSIS

NOTATION: (i) In triangle ABC the sides BC, CA, AB are denoted by a, b, c respectively. The angles BAC, CBA, ACB are denoted by A, B, C respectively. The semi perimeter of the triangle is denoted by 's'. The area of a triangle is denoted by D.

(ii) $s = \frac{a+b+c}{2}$

CIRCUMCIRCLE: The point of concurrence of the perpendicular bisectors of the sides of a triangle ABC is called the circumcentre and is denoted by 'S'. It is equidistant from the three vertices of the triangle i.e. SA = SB = SC = R.

The circle with centre S and radius R passes through the three vertices of the triangle is called the circumcircle. S is called circumcentre and R is called circumradius.

INCIRCLE: The point of concurrence of the internal bisectors of the angles of a triangle is called the incentre and is denoted by I. It is equidistant from the sides. The circle with centre I and the length of the perpendicular from I to any side of the triangle as radius touches the sides of the triangle internally and this circle is known as Incircle. The radius of the incircle is called inradius and is denoted by 'r'.

EX-CIRCLES: The point of concurrence of internal bisector of the angle A and external bisectors of the angles B and C is called the excentre opposite to A and is denoted by 'I_1'. The circle with centre I_1 and the perpendicular distance r_1 from I_1 to any one of the three sides as radius is called the excircle oppsite to A. Its radius r_1 is called the ex-radius.

The Centres of the remaining two excircles opposite to B and C are denoted by I_2, I_3 and their radii are denoted by r_2, r_3.

➡ **Sine Rule :**

$$\frac{a}{SinA} = \frac{b}{SinB} = \frac{c}{SinC} = 2R$$

$a = 2R\, Sin A,\ b = 2R\, Sin B,\ c = 2R\, Sin C$

➡ **Cosine Rule :**

$a^2 = b^2 + c^2 - 2bc\, Cos A$

$b^2 = c^2 + a^2 - 2ca\, Cos B$

$c^2 = a^2 + b^2 - 2ab\, Cos C$

$$Cos A = \frac{b^2+c^2-a^2}{2bc}$$

$$Cos B = \frac{c^2+a^2-b^2}{2ca}$$

$$Cos C = \frac{a^2+b^2-c^2}{2ab}$$

➡ **Projection formulae :**

$a = b\, Cos C + c\, Cos B$

$b = c\, Cos A + a\, Cos C$

$c = a\, Cos B + b\, Cos A$

➡ $D = \frac{1}{2} bc\, Sin A = \frac{1}{2} ca\, Sin B$

$= \frac{1}{2} ab\, Sin C$

$= \sqrt{s(s-a)(s-b)(s-c)}$

$= 2R^2 Sin A\, Sin B\, Sin C = \frac{abc}{4R}$

➡ $Sin A = \frac{2\Delta}{bc} = \frac{2}{bc}\sqrt{s(s-a)(s-b)(s-c)}$

$Sin B = \frac{2\Delta}{ca} = \frac{2}{ca}\sqrt{s(s-a)(s-b)(s-c)}$

$Sin C = \frac{2\Delta}{ab} = \frac{2}{ab}\sqrt{s(s-a)(s-b)(s-c)}$

➡ $Sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$

$sin \frac{B}{2} = \sqrt{\frac{(s-c)(s-a)}{ca}}$

$sin \frac{C}{2} = \sqrt{\frac{(s-a)(s-b)}{ab}}$

➡ $Cos \frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}},\ Cos \frac{B}{2} = \sqrt{\frac{s(s-b)}{ca}}$

$Cos \frac{C}{2} = \sqrt{\frac{s(s-c)}{ab}}$

➡ $\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}} = \frac{(s-b)(s-c)}{\Delta}$

$= \frac{\Delta}{s(s-a)} = \sqrt{\frac{rr_1}{r_2r_3}} = \sqrt{\frac{r_1-r}{r_2+r_3}}$

$\tan \frac{B}{2} = \sqrt{\frac{(s-c)(s-a)}{s(s-b)}} = \frac{(s-c)(s-a)}{\Delta}$

$= \frac{\Delta}{s(s-b)} = \sqrt{\frac{rr_2}{r_1r_3}} = \sqrt{\frac{r_2-r}{r_1+r_3}}$

$\tan \frac{C}{2} = \sqrt{\frac{(s-a)(s-b)}{s(s-c)}} = \frac{(s-a)(s-b)}{\Delta}$

$= \frac{\Delta}{s(s-c)} = \sqrt{\frac{rr_3}{r_1r_2}} = \sqrt{\frac{r_3-r}{r_1+r_2}}$

➡ $Cot\frac{A}{2} = \frac{s(s-a)}{\Delta},\ Cot\frac{B}{2} = \frac{s(s-b)}{\Delta}$

$Cot\frac{C}{2} = \frac{s(s-c)}{\Delta}$

➡ **Napier's Formulae : Tangent rule**

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

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

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

➡ **Mollweide formulae:**

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

$$\frac{c-a}{b} = \frac{Sin\left(\frac{C-A}{2}\right)}{Cos\frac{B}{2}};\ \frac{c+a}{b} = \frac{Cos\left(\frac{C-A}{2}\right)}{Sin\frac{B}{2}}$$

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

➡ $CotA = \frac{b^2+c^2-a^2}{4\Delta},\ CotB = \frac{c^2+a^2-b^2}{4\Delta}$

$CotC = \frac{a^2+b^2-c^2}{4\Delta}$

➡ $Cot A + Cot B + Cot C = \frac{a^2+b^2+c^2}{4\Delta}$

➡ If $Cot\frac{A}{2}, Cot\frac{B}{2}, Cot\frac{C}{2}$ are in A.P. then a,b,c are also in A.P.

➡ If Cot A, cot B, cot C are in A.P. then a^2, b^2, c^2 are also in A.P.

➡ If $\sin^2\frac{A}{2}, \sin^2\frac{B}{2}, \sin^2\frac{C}{2}$ are in H.P. then a,b,c are also in H.P.

➡ (i) In a triangle ABC

$\cos A + \cos B + \cos C = 1 + \frac{r}{R}$

(ii) $\sin A + \sin B + \sin C = \frac{s}{R}$

➡ If $\cot\frac{A}{2} : \cot\frac{B}{2} : \cot\frac{C}{2} = k : l : m$ then

$a : b : c = l + m : m + k : k + l$

SOLVED EXAMPLES

1. The greatest angle of the triangle ABC, where $a = 2, b = \sqrt{6}$ and $c = \sqrt{3}+1$ is

1) 120^0 2) 105^0 3) 45^0 4) 15^0

Sol: Given $a = 2, b = \sqrt{6}$ and $c = \sqrt{3}+1$

Hence c is the greatest side

$\therefore$ C is greatest angle.

But $\cos C=\dfrac{a^2+b^2-c^2}{2ab}$

$\Rightarrow \cos C=\dfrac{4+6-\left(3+1+2\sqrt{3}\right)}{2\times 2\times\sqrt{6}}$

$=\dfrac{3-\sqrt{3}}{2\sqrt{6}}=\dfrac{\sqrt{3}\left(\sqrt{3}-1\right)}{2\sqrt{2}\sqrt{3}}$

$\Rightarrow \cos C=\cos 75^0 \quad \therefore C=75^0$

Ans : 4

2. In triangle ABC, if $a=3,b=4,c=5$ then $\sin 2B=$

1) $\frac{24}{25}$ 2) $\frac{-24}{25}$ 3) $\frac{25}{24}$ 4) none

Sol: We know that

$\cos B=\dfrac{a^2+b^2-c^2}{2ab}=\dfrac{9+25-16}{2\times 3\times 5}$

$\Rightarrow \cos B=\frac{3}{5}\Rightarrow \sin B=\frac{4}{5}$

$\therefore \sin 2B=2\sin B\cos B=2\left(\frac{4}{5}\right)\left(\frac{3}{5}\right)=\frac{24}{25}$

Ans : 1

3. In triangle ABC, if the angles are in A.P. and $\dfrac{a+c}{\sqrt{a^2+c^2-ac}}=k\cos\left(\dfrac{A-C}{2}\right)$ then k=

1) 1 2) 2 3) -1 4) -2

Sol:Since the angles A,B,C are in A.P.

$2B=A+C$ ------(1)

In ΔABC, $A+B+C=180^0$ ....(2)

from (1) and 2) $B=60^0$ ......(3)

we have $\cos B=\dfrac{a^2+c^2-b^2}{2ac}$ ....(4)

from (3) and (4)

$ac=a^2+c^2-b^2\Rightarrow b^2=a^2+c^2-ac$ ...(5)

$\therefore \dfrac{a+c}{\sqrt{a^2+c^2-ac}}=\dfrac{a+c}{b}$ [from (5)]

$=\dfrac{\cos\left(\frac{A-C}{2}\right)}{\sin\frac{B}{2}}$ (from Mollowide Rule)

$=2\cos\left(\dfrac{A-C}{2}\right)$ (since $B=60^0$)

$\therefore k=2 \quad \therefore$ **Ans : 2**

4. In triangle ABC, if the angles are in A.P and $B:C=\sqrt{3}:\sqrt{2}$ then A =

1) 30^0 2) 50^0 3) 75^0 4) 60^0

Sol:Since the angles A,B,C are in A.P., $B=60^0$, Given $B:C=\sqrt{3}:\sqrt{2}$

$\Rightarrow \sin C=\dfrac{1}{\sqrt{2}}$ (since $B=60^0$)

$\Rightarrow C=45^0$ Hence $A=75^0$

(Since $A+B+C=180^0$)

Ans : 3

5. The circum diameter of the triangle with sides 61, and 60 and 11 is

1) 61 2) 30 3) 11 4) none

Sol:Given sides 61, 60 & 11 form a right angled triangle whose hypotenuse is 61.

Hence circum diameter = 61

Ans : 1

6. In triangle ABC, if $a\cos^2\frac{C}{2}+c\cos^2\frac{A}{2}=\frac{3b}{2}$ then a,b,c are in

1) G.P 2) H.P. 3) A.P. 4) none

Sol:Given $a\cos^2\frac{C}{2}+c\cos^2\frac{A}{2}=\frac{3b}{2}$

By using $\cos^2\frac{A}{2}=\frac{1+\cos A}{2}$

$a\left(\frac{1+\cos C}{2}\right)+c\left(\frac{1+\cos A}{2}\right)=\frac{3b}{2}$

$\Rightarrow \frac{a}{2}+\frac{a\cos C}{2}+\frac{c}{2}+\frac{c\cos A}{2}=\frac{3b}{2}$

$\Rightarrow \frac{a}{2}+\frac{c}{2}+\frac{1}{2}\left(a\cos C+c\cos A\right)=\frac{3b}{2}$

$\Rightarrow \frac{a+c}{2}+\frac{1}{2}b=\frac{3b}{2}$ (By projection Rule)

$\Rightarrow a+c=2b$

$\therefore a,b,c$ are in A.P

Ans : 3

7. In triangle ABC, if $\cos A+2\cos B+\cos C=2$ then the sides are in

1) A.P. 2) H.P. 3) G.P. 4) none

Sol:Given $\cos A+2\cos B+\cos C=2$

$\Rightarrow \cos A+\cos C=2\left(1-\cos B\right)$

$\Rightarrow 2\cos\left(\frac{A+C}{2}\right)\cos\left(\frac{A-C}{2}\right)=4\sin^2\frac{B}{2}$

$\Rightarrow \sin\frac{B}{2}\cos\left(\frac{A-C}{2}\right)=2\sin^2\frac{B}{2}$

since $\frac{A+C}{2}=90-\frac{B}{2}$

$\Rightarrow \cos\left(\frac{A-C}{2}\right)=2\sin\frac{B}{2}$ (since $\sin\frac{B}{2}\neq 0$)

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

(By Molloweide Rule)

$\therefore a,b,c$ are in A.P. Ans : (1)

8. In triangle ABC, if $\cot\frac{A}{2}=\frac{b+c}{a}$ then

1) $A=90^0$ 2) $B=90^0$

3) $C=90^0$ 4) none

Sol:Given $\cot\frac{A}{2}=\frac{b+c}{a}$

$\Rightarrow \dfrac{\cos\frac{A}{2}}{\sin\frac{A}{2}}=\dfrac{\cos\left(\frac{B-C}{2}\right)}{\sin\frac{A}{2}}$

(By Molloweide Rule)

$\Rightarrow \cos\frac{A}{2}=\cos\left(\frac{B-C}{2}\right)$ (since $\sin\frac{A}{2}\neq 0$)

$\Rightarrow \frac{A}{2}=\frac{B-C}{2}\Rightarrow A+C=B=90^0$

Ans : 2

Note : If the sum of two angles of a triangle is equal to third then the triangle is right angled at the third angle.

9. In triangle ABC if $a=2\left(\sqrt{3}+1\right); B=45^0$ & $C=60^0$ then area of the triangle is

1) $3+\sqrt{3}$ sq.units 2) $2\left(3-\sqrt{3}\right)$ sq.units

3) $2\left(3+\sqrt{3}\right)$ sq.units 4) none

Sol:By using Area of $\Delta=\dfrac{1}{2}\dfrac{a^2\sin B\sin C}{\sin\left(B+C\right)}$

$\Delta=\dfrac{14\left(\sqrt{3}-1\right)^2\sin 45^0\sin 60^0}{\sin 105^0}$

$=\dfrac{2\left(3+1+2\sqrt{3}\right)\frac{1}{\sqrt{2}}\frac{\sqrt{3}}{2}}{\frac{\sqrt{3}+1}{2\sqrt{2}}}=2\left(3+\sqrt{3}\right)$

Ans : 3

10. If the angle of a triangle are in the ratio 1 : 2 : 7 then the ratio of the greatest side to the least side is

1) $\sqrt{5}+1:\sqrt{5}-1$ 2) $\sqrt{5}-2:\sqrt{5}+1$

3) $\sqrt{5}-1:\sqrt{5}+1$ 4) none

Sol:Given $A:B:C=1:2:7$

Let A = k ; B = 2k, C = 7k

We have $A+B+C=180^0$

$\Rightarrow 10k=180^0$ or $k=18^0$

$\Rightarrow$ c and a are the greatest and smallest sides respectively.

$c:a=\sin C:\sin A=\sin 126^0:\sin 18^0$

$= \frac{\sqrt{5}+1}{6} : \frac{\sqrt{5}-1}{6} = \sqrt{5}+1 : \sqrt{5}-1$

11. If the sides of a triangle are 13, 14, 15 then radius of the in-circle is

1) $\frac{67}{6}$ 2) $\frac{65}{4}$ 3) 4 4) 24

Sol: Given sides are $a=13, b=14, c=15$

$s=\frac{a+b+c}{2}=21$

Area $\Delta=\sqrt{s(s-a)(s-b)(s-c)}=84$

$r=\frac{\Delta}{s}=4$ $\therefore$ Ans (3)

Note : similarly $r_1=\frac{\Delta}{s-a}, r_2=\frac{\Delta}{s-b}, r_3=\frac{\Delta}{s-c}$

12. If the ex-radii of a triangle are 36, 18, 12 then area of the triangle is .....sq units and circum radius is ...

Sol: Given $r_1=36, r_2=18 \& r_3=12$

using $\frac{1}{r}=\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}$, we get $r=6$

by using $\Delta^2=r r_1 r_2 r_3$

$\Delta^2=6(36)(18)(12)=(36)^2\times 6^2$

$\Rightarrow \Delta=36\times 6=216$ sq.units

but $r_1+r_2+r_3-r=4R \Rightarrow R=15$

3. In triangle ABC if $r_1=18; r_2=12 \& r_3=24$ then $a=$

1) 13 2) 12 3) 10 4) none

Sol: By using $\frac{1}{r}=\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}$, we get $r=4$

$a^2=(r_1-r)(r_2+r_3)$

$=(8-4)(12+24) \Rightarrow a=12$

Ans : 2

4. In ΔABC, if $r_1=r_2 r_3$ then the triangle is

1) equilateral 2) isosceles
3) right angled 4) none

Sol: Given $r r_1=r_2 r_3 \Rightarrow \frac{r r_1}{r_2 r_3}=1$

$\Rightarrow \tan^2\frac{A}{2}=1$ i.e, $\tan\frac{A}{2}=1$

since $\frac{A}{2}$ is half angle in Δ, no need to take ± 1

$\frac{A}{2}=45^0 \Rightarrow A=90^0$

$\therefore$ The Δ is right angled at A Ans : 3

5. In ΔABC, if $r:R:r_1=2:5:12$ then

1) $A=90^0$ 2) $B=90^0$
3) $C=90^0$ 4) none

Sol: Given $r:R:r_1=2:5:12$

Let $r=2k; R=5k \& r_1=12k$

now $r_1-r=10k$

$r_1-r=2R \Rightarrow \sin^2\frac{A}{2}=2R$

$\sin^2\frac{A}{2}=\frac{1}{2}$ or $\sin\frac{A}{2}=\frac{1}{\sqrt{2}}$

$\Rightarrow \frac{A}{2}=45^0$ i.e., $A=90^0$

Ans : 1

THERE IS NO SUBSTITUTE TO HARDWORK

PRACTICE SET - I

01. $\Sigma(b+c)\cos A=$
1) s 2) 2s 3) 2(s-a) 4) 4 s

02. $\Sigma\frac{\sin(B-C)}{bc}=$
1) D 2) s 3) 0 4) s^2

03. $\Sigma\frac{(b^2-c^2)}{a}\cos A=$
1) s 2) 0 3) D 4) 2D

04. $\Sigma a\cos A=$
1) 4R cos A cos B cos C
2) 4R sin A sin B sin C
3) 2R sin A sin B sin C
4) 2R cos A cos B cos C

05. $\frac{\cos A}{c\sin B}+\frac{\cos B}{a\sin C}+\frac{\cos C}{b\sin A}=$
1) $\frac{1}{R}$ 2) $\frac{\Delta}{R}$ 3) $\frac{s}{R}$ 4) $\frac{3}{R}$

06. $\Sigma a^3\cos(B-C)=$
1) abc 2) 2abc 3) 3abc 4) 0

07. $b^2\sin 2C+c^2\sin 2B=$
1) D 2) 2D 3) 4D 4) D/2

08. $4R\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}=$
1) D 2) s 3) r 4) 2s

09. $4R\,s\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}=$
1) D 2) 2D 3) r 4) 2r

10. $s^2\tan\frac{A}{2}\tan\frac{B}{2}\tan\frac{C}{2}$
1) D 2) 2D 3) R 4) 4R

11. $\frac{b-c}{a}\cos^2\frac{A}{2}+\frac{c-a}{b}\cos^2\frac{B}{2}+\frac{a-b}{c}\cos^2\frac{C}{2}=$
1) R 2) s 3) r 4) 0

12. $\Sigma\frac{1}{a}\cos^2\frac{A}{2}=$
1) 0 2) $\frac{s^2}{abc}$ 3) D 4) 3s

13. $\cot A+\cot B+\cot C$
1) $\frac{a+b+c}{4\Delta}$ 2) $\frac{a^2+b^2+c^2}{4\Delta}$
3) $\frac{(a+b+c)^2}{4\Delta}$ 4) $\frac{1}{\Delta}$

14. $\cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2}=$
1) $\frac{a+b+c}{4\Delta}$ 2) $\frac{a^2+b^2+c^2}{4\Delta}$
3) $\frac{(a+b+c)^2}{4\Delta}$ 4) $\frac{(a+b+c)^2}{2\Delta}$

15. $a^2\cot A+b^2\cot B+c^2\cot C=$
1) Δ 2) 2Δ 3) 3Δ 4) 4Δ

16. In ΔABC, abc $\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}=$
1) Δ^2 2) $\frac{\Delta^2}{s}$ 3) $\Delta^2 s$ 4) $\frac{s}{\Delta^2}$

17. In ΔABC, $\sum a\sin(B-C)=$
1) abc 2) 2abc 3) 3abc 4) 0

18. In ΔABC, $\sum\frac{a^2\sin(B-C)}{\sin A}=$
1) a^2b^2 2) b^2c^2 3) c^2a^2 4) 0

19. In ΔABC, $\sum\frac{a^2\sin(B-C)}{\sin B+\sin C}$
1) a + b 2) b + c 3) c + a 4) 0

20. In Δ ABC, $\sum\frac{b^2-c^2}{a^2}\sin 2A=$
1) 0 2) a^2+b^2 3) b^2+c^2 4) c^2+a^2

21. In ΔABC, $\sum a^3\sin(B-C)=$
1) $a^3b^3c^3$ 2) 3abc 3) $3a^2b^2c^2$ 4) 0

22. In ΔABC, $\frac{1}{2}a^2\frac{\sin B\sin C}{\sin A}=$
1) D 2) 2D 3) 3D 4) 4D

23. In ΔABC, $\Sigma\left(\frac{b-c}{a}\right)\cos^2\frac{A}{2}=$
1) abc 2) $a^3b^3c^3$ 3) 3abc 4) 0

24. In ΔABC if $a\cos A+b\cos B+c\cos C=\frac{2\Delta}{k}$ then k =
1) r 2) R 3) s 4) R^2

25. In ΔABC
$(b-c)\cot\frac{A}{2}+(c-a)\cot\frac{B}{2}+(a-b)\cot\frac{C}{2}$
1) abc 2) ab - bc - ca
3) 3 abc 4) 0

26. $\Sigma a^2(\cos^2 B-\cos^2 C)=$
1) 0 2) 1 3) 2 4) 3

27. $\frac{\sin A(a-b\cos C)}{\sin C(c-b\cos A)}=$
1) -2 2) -1 3) 0 4) 1

28. $(a+b+c)\left(\tan\frac{A}{2}+\tan\frac{B}{2}\right)\tan\frac{C}{2}=$
1) c 2) c/2 3) 2c 4) 3c

29. $(a-b)^2\cos^2\frac{C}{2}+(a+b)^2\sin^2\frac{C}{2}$ - [EAMCET-04]
1) c 2) c/2 3) 2c 4) c^2

30. If $a(b\cos C+c\cos B)=2ka^2$, then k =
1) 0 2) 1 3) ½ 4) 2

31. If $A=60^0$, then the value of
$\left(1+\frac{a}{c}+\frac{b}{c}\right)\left(1+\frac{c}{b}-\frac{a}{b}\right)=$
1) 3 2) 2 3) 1 4) 4

32. $\frac{b-c}{a}\sin\left(\frac{B+C}{2}\right)=$
1) $\cos\left(\frac{B-C}{2}\right)$ 2) $\sin\left(\frac{B-C}{2}\right)$
3) $\sin\left(\frac{A-B}{2}\right)$ 4) $\cos\left(\frac{A-B}{2}\right)$

33. $(b+c)\sin\frac{A}{2}$
1) $a\cos\left(\frac{B+C}{2}\right)$ 2) $a\sin\left(\frac{B+C}{2}\right)$
3) $a\cos\left(\frac{B-C}{2}\right)$ 4) $a\sin\left(\frac{A}{2}+B\right)$

34. $\frac{b+c}{a}\sin\frac{A}{2}$
1) $\cos\left(\frac{B+C}{2}\right)$ 2) $\sin\left(\frac{B+C}{2}\right)$
3) $\cos\left(\frac{B-C}{2}\right)$ 4) $\sin\left(\frac{B-C}{2}\right)$

35. $b\cos^2\frac{C}{2}+c\cos^2\frac{B}{2}=$
1) s 2) s - a 3) s - b 4) s - c

36. a (cos C - cos B) =
1) $2(a-b)\cos^2\frac{C}{2}$ 2) $2(a+b)\cos^2\frac{C}{2}$
3) $2(b-c)\cos^2\frac{A}{2}$ 4) $2(b+c)\cos^2\frac{A}{2}$

37. $a\sin^2\frac{C}{2}+c\sin^2\frac{A}{2}=$
1) s 2) s - a 3) s - b 4) s - c

38. $\frac{a(\cos B+\cos C)}{2(b+c)}$
1) $\cos^2\frac{A}{2}$ 2) $\sin^2\frac{A}{2}$
3) $\tan^2\frac{A}{2}$ 4) $\cot^2\frac{A}{2}$

39. $(a+b+c)\left(\tan\frac{A}{2}+\tan\frac{B}{2}\right)=$
1) $2c\cot\frac{A}{2}$ 2) $2c\cot\frac{B}{2}$
3) $2c\cot\frac{C}{2}$ 4) $2c\tan\frac{C}{2}$

40. If $\frac{b}{c+a}+\frac{c}{a+b}=1$, then
1) $A=60^0$ 2) $B=60^0$
3) $C=60^0$ 4) $A=90^0$

41. If $\frac{b}{c^2-a^2}+\frac{a}{c^2-b^2}=0$, then
1) $A=60^0$ 2) $B=60^0$
3) $C=60^0$ 4) $C=90^0$

42. A triangle ABC is such that aCosA=bCosB, then the triangle is
1) right angled 2) isosceles
3) right angled or isosceles 4) equilateral

43. If $\sin^2A+\sin^2B=\sin^2C$, then the triangle is
1) isosceles 2) right angled
3) equilateral 4) scalene

44. If the cosines of angles of a triangle are proportional to opposite sides, then the triangle is
1) isosceles 2) right angled
3) equilateral 4) isosceles or right angled

45. In triangle ABC, if $r.r_1=r_2.r_3$, then the triangle is
1) equilateral 2) isosceles
3) right angled 4) scalene

46. In DABC, if bCosA=aCosB then the triangle is
1) right angled 2) isosceles
3) equilateral 4) scalene

47. If the circumcentre of a triangle lies inside the triangle then the triangle is
1) right angled 2) acute angled
3) obtuse angled 4) scalene

48. If a, b, c are in A.P., then $\cot\frac{A}{2},\cot\frac{B}{2},\cot\frac{C}{2}$ are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P

49. If the angles of the ΔABC are in A.P., then $a^2+c^2-ac=$
1) bc 2) b^2c 3) abc 4) b^2

50. If a, b, c are in A.P. then $\cot\frac{A}{2}\cot\frac{C}{2}=$
1) 1 2) 2 3) 3 4) 4

51. If a = 5, b = 6, sin A = 5/6, then B =
1) π 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

52. If $a=\sqrt{3}+1$, b = 2, B = 45°, then A =
1) 30° 2) 60° 3) 75° 4) 45°

53. If $a=\sqrt{3}+1$, B = 30°, C = 45°, then c=
1) 2 2) 3 3) 4 4) 1

54. If A = 30°, b = 8, a = 6, $B=\sin^{-1}x$, then x =
1) 1/2 2) 1/3 3) 2/3 4) 1

55. If a = 10, R = 5, then A =
1) π 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

56. If a = 4, b = 5, C = 60°, then c =
1) $2\sqrt{3}$ 2) $\sqrt{21}$ 3) 8 4) 14

57. If a = 4cm, b = 5 cm, c = 7 cm, then $\cos\frac{A}{2}=$
1) $1/\sqrt{5}$ 2) $1/\sqrt{2}$
3) $\sqrt{32/35}$ 4) 2/3

58. If a = 4 cm, b = 7 cm, c = 9 cm, then $\tan\frac{A}{2}=$
1) $1/\sqrt{5}$ 2) $1/\sqrt{20}$ 3) $\sqrt{20}$ 4) 2/3

59. If a = 13 cm, b = 12 cm, c = 5 cm, then $\sin\frac{A}{2}=$
1) $1/\sqrt{5}$ 2) $1/\sqrt{2}$ 3) $\sqrt{32/35}$ 4) 2/3

60. If a=13 cm, b=14 cm, c=15 cm, then tan(C/2)=
1) $1/\sqrt{5}$ 2) $1/\sqrt{2}$ 3) $\sqrt{32/35}$ 4) 2/3

61. If a=7, $b=7\sqrt{3}$ and right angled at C, then c =
1) $2\sqrt{3}$ 2) $\sqrt{21}$ 3) 8 4) 14

62. If the angles of a triangle are 30°, 45° and the included side is $\sqrt{3}+1$, then the remaining sides can be
1) $2,\sqrt{2}$ 2) $2,2\sqrt{3}$ 3) $\sqrt{2},4$ 4) $2,4\sqrt{3}$

63. If 4,5 are two sides of a triangle and the included angle is 60°, then its area is
1) 3 2) 5 3) $5\sqrt{3}$ 4) $3\sqrt{3}$

64. Two straight roads intersect at an angle of 60°. A bus on one road is 2 km. away from the intersection and a car on the other road is 3 km. away from the intersection. Then the direct distance between the two vehicles is
1) 1 km 2) $\sqrt{2}$ km 3) 4 km 4) $\sqrt{7}$ km

65. If the length of each side of an equilateral triangle is 10 cm, then its circumradius is
1) $10\sqrt{3}$ 2) $3\sqrt{10}$ 3) $3/\sqrt{10}$ 4) $10/\sqrt{3}$

66. If the sides of a triangle are 8,15,17, then the radius of its circumcircle is
1) 15/2 2) 13/2 3) 5/2 4) 17/2

67. If the sides of a triangle are 5,7,8, then its area is
1) $10\sqrt{3}$ 2) $3\sqrt{10}$ 3) $3/\sqrt{10}$ 4) $10/\sqrt{3}$

68. If the sides of a triangle are in the ratio x : y : $\sqrt{x^2+xy+y^2}$, then the greatest angle is
1) 90° 2) 120° 3) $Cos^{-1}\left(\frac{x+y}{x-y}\right)$ 4) 30°

69. If the angles of a triangle are in the ratio 2 : 3 :5, then the ratio of the greatest side to the least side is
1) $2:\sqrt{10-2\sqrt{5}}$ 2) $4:\sqrt{10-2\sqrt{5}}$
3) $2:\sqrt{10+2\sqrt{5}}$ 4) $74:\sqrt{10+2\sqrt{5}}$

70. In a triangle ABC tanA + tan B+ tan C = $3\sqrt{3}$, then the triangle is
1) isosceles 2) right angled
3) equilateral 4) scalene

71. The radius of the circumcircle of an isosceles triangle PQR is equal to PQ (=PR), then the angle P is
1) $\pi/6$ 2) $\pi/3$ 3) $\pi/2$ 4) $2\pi/3$

72. In a right angled ΔABC, $sin^2 A+sin^2 B+sin^2 C=$
1) 0 2) 1 3) -1 4) 2

73. If two sides of a triangle are 3 feet and 12 feet and included angle is 150° then the area of the triangle in square feet is
1) 36 2) 24 3) 72 4) 9

74. If b + c = 3a then $Tan\frac{B}{2}Tan\frac{C}{2}=$
1) 1/2 2) 1/3 3) 1/4 4) 1/5

75. In ΔABC if (SinA+SinB+SinC) (SinA+SinB-SinC) = 3SinASinB then C=
1) 30^0 2) 45^0 3) 60^0 4) 120^0

76. In ΔABC if a=30, b=24, c=18 then Δ=
1) 16 2) 216 3) $\sqrt{216}$ 4) 17

77. If the sides of a triangle are 4 cm, 5 cm, 6 cm then ratio of the least and greatest angles is
1) 1 : 2 2) 2 : 1 3) 3 : 4 4) 5 : 6

78. If 7, $4\sqrt{3}$, $\sqrt{13}$ are the sides of ΔABC then least angle is
1) 45^0 2) 60^0 3) 90^0 4) 30^0

79. If the sides of a triangle are 17 cm, 8 cm, 15 cm then its circumradius in cm is
1) 17 2) 7.5 3) 8.5 4) 4

80. If $3+\sqrt{3}$ cm; $3-\sqrt{3}$ cm and 60° are two sides of a triangle and included angle respectively then its third side in cm is
1) 3 2) $3\sqrt{2}$ 3) $\sqrt{6}$ 4) $4\sqrt{2}$

81. If the sides of ΔABC are 56 cm, 65 cm, 33 cm then its greatest angle is
1) 60^0 2) 120^0 3) 90^0 4) 30^0

82. In ΔABC if b=$\sqrt{3}$, c=1, A=30^0 then C=
1) 30^0 2) 45^0 3) 60^0 4) 90^0

83. If the two sides of a triangle and included angle are a=$(1+\sqrt{3})$ cm, b=2 cm and C=60^0 respectively then A=
1) 60^0 2) 120^0 3) 75^0 4) 45^0

84. $a^2\cot A+b^2\cot B+c^2\cot C=$
1) D 2) 2D 3) 3D 4) 4D

85. $4(r_1r_2+r_2r_3+r_3r_1)$
1) a+b+c 2) $(a+b+c)^2$ 3) 2 / r 4) 3 /r

86. $r_2r_3\tan\frac{A}{2}=$
1) a 2) b 3) c 4) D

87. $(r_1+r_2)\tan\frac{C}{2}=$
1) a 2) b 3) c 4) 0

88. $(r_3-r)\cot\frac{C}{2}=$
1) a 2) b 3) c 4) 0

89. $r^2\cot\frac{A}{2}.\cot\frac{B}{2}.\cot\frac{C}{2}=$
1. $(r_2+r_3)\sec^2\frac{A}{2}$ 2. $r_1r_2r_3$
3. D 4. s

90. $(r_1-r)(r_2+r_3)=$
1) a^2 2) b^2 3) c^2 4) a^2b^2

91. $rr_1+r_2r_3=$
1) ab 2) bc 3) ac 4) a/bc

92. If a^2, b^2, c^2 are in A.P. then CotA, CotB, CotC are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

93. In a triangle, if the sum of two sides is x and their product is y such that (x+z) (x - z) = y where z is the third side then the triangle is
1) obtuse angled 2) right angled
3) isosceles 4) equilateral

94. In a triangle ABC, A : B : C = 3:5:4 then $a+b+c\sqrt{2}=$ [AIEEE 2002]
1) 3a 2) 3c 3) 3b 4) 2c

PRACTICE SET - I KEY

1) 2	2) 3	3) 2	4) 2	5) 1
6) 3	7) 3	8) 2	9) 1	10) 1
11) 4	12) 2	13) 2	14) 3	15) 4
16) 2	17) 4	18) 4	19) 4	20) 1
21) 4	22) 1	23) 4	24) 2	25) 4
26) 1	27) 4	28) 3	29) 4	30) 3
31) 1	32) 2	33) 3	34) 3	35) 1
36) 3	37) 3	38) 2	39) 3	40) 1
41) 3	42) 3	43) 2	44) 3	45) 3
46) 2	47) 2	48) 1	49) 4	50) 3
51) 2	52) 3	53) 1	54) 3	55) 2
56) 2	57) 3	58) 2	59) 2	60) 4
61) 4	62) 1	63) 3	64) 4	65) 4
66) 4	67) 1	68) 2	69) 2	70) 3
71) 4	72) 4	73) 4	74) 1	75) 3
76) 2	77) 1	78) 4	79) 3	80) 2
81) 3	82) 1	83) 3	84) 4	85) 2
86) 4	87) 3	88) 3	89) 3	90) 1
91) 2	92) 1	93) 1	94) 3	

PRACTICE SET - II

01. If (a + b + c) (b + c - a) = 3 bc, then
1) A = 60^0 2) B = 60^0 3) C = 60^0 4) A = 90^0

02. If $\frac{1}{a+b}+\frac{1}{a+c}=\frac{3}{a+b+c}$ then
1) A = 60^0 2) B = 60^0 3) C = 60^0 4) A = 90^0

03. If $SinC=\frac{SinA}{2CosB}$, then the triangle is
1) right angled 2) isosceles
3) right angled isosceles 4) scalene

04. For a ΔABC it is given that CosA+CosB+CosC=3/2 then the triangle is
1) isosceles 2) equilateral
3) right angled 4) scalene

05. If $Sin^2A+Cos^2B+Sin^2C=1$, then the triangle ABC is
1) isosceles 2) equilateral
3) right angled 4) scalene

06. If CotA + CotB + CotC = $\sqrt{3}$, then the triangle ABC is
1) isosceles 2) equilateral
3) right angled 4) scalene

07. In ΔABC if $\frac{SinB}{SinC}$=2CosA then the triangle is
1) right angled 2) isosceles
3) equilateral 4) scalene

08. In ΔABC, if $2Sin^2B+2Sin^2C+Cos2A=1$ then the triangle is
1) right angled 2) isosceles
3) equilateral 4) right angled and isosceles

09. If a, b, c are in H.P., then $Sin^2\frac{A}{2}, Sin^2\frac{B}{2}, Sin^2\frac{C}{2}$ are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

10. If $\frac{SinA}{SinC}=\frac{Sin(A-B)}{Sin(B-C)}$ then a^2, b^2, c^2 are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

11. If a, b, c are in A.P. then $\frac{2Sin\frac{A}{2}Sin\frac{C}{2}}{Sin\frac{B}{2}}=$
1) 1 2) 2 3) 3 4) 4

12. If the angles of a right angled triangle are in A.P., then ratio of its sides is
1) 3 : 4 : 5 2) $1:1:\sqrt{2}$
3) $2:3:\sqrt{13}$ 4) 1 : 2 : 3

13. If aSecA, bSecB, cSecC are in H.P. then a^2, b^2, c^2 are in
1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

14. If the perimetre of a triangle is six times the arithmetic mean of the sine angles and the side 'a' is unity, then A=
1) $\pi/6$ 2) $\pi/4$ 3) $\pi/3$ 4) $\pi/2$

15. If twice the square of the radius of a circle is equal to half the sum of the squares of the sides of inscribed triangle ABC, then $\sin^2A+\sin^2B+\sin^2C$ =
1) 1 2) 2 3) 4 4) 8

16. If C = 90° then $\frac{a^2+b^2}{a^2-b^2}\sin(A-B)=$
1) 1 2) 2 3) 3 4) 4

17. If a:b:c = 3:4:5, then sin A : sin B : sin C =
1) 3 : 4 : 5 2) 9 : 16 : 25
3) 9 : 8 : 7 4) 7 : 9 : 8

18. If a : b : c = 7 : 8 : 9, then cos A : cos B : cos C =
1) 7 : 9 : 11 2) 14 : 11 : 6
3) 7 : 19 : 25 4) 8 : 6 : 5

19. If b + c : c + a : a + b = 11 : 12 : 13, then cos A : cos B : cos C =
1) 7 : 9 : 11 2) 14 : 11 : 6
3) 7 : 19 : 25 4) 8 : 6 : 5

20. If $\cot\frac{A}{2}:\cot\frac{B}{2}:\cot\frac{C}{2}=3:7:9$, then a:b:c =
1) 7 : 9 : 11 2) 14 : 11 : 6
3) 7 : 19 : 25 4) 8 : 6 : 5

21. The area Δ of a triangle ABC is given by $\Delta = a^2-(b-c)^2$ then $\mathrm{Tan}\frac{A}{2}=$
1) -1 2) 0 3) 1/4 4) 1/2

22. There exists ΔABC satisfying the conditions
1) bSinA=a; $A<\frac{\pi}{2}$ 2) bSinA>a; $A>\frac{\pi}{2}$
2) bSinA>a; $A>\frac{\pi}{2}$ 4) bSinA<a; $A>\frac{\pi}{2}$; b=a

23. In a triangle ABC, angle A is greater than angle B. If the measures of angles A and B satisfy the equation $3\mathrm{Sin}x - 4\mathrm{Sin}^3x - k = 0$, 0<k<1, then the measure of angle C is
1) $\frac{\pi}{3}$ 2) $\frac{\pi}{2}$ 3) $\frac{2\pi}{3}$ 4) $\frac{5\pi}{6}$

24. If the length of the side of an equilateral triangle is $2\sqrt{3}$ cm then its circumradius in cm is
1) 1 2) 2 3) 3 4) 4

25. If $\frac{2y}{5z}+\frac{2z}{5x}, \frac{2z}{5x}+\frac{2x}{5y}, \frac{2x}{5y}+\frac{2y}{5z}$ are the sides of a triangle then its area is
1) $\frac{4}{25}\sqrt{\frac{x}{y}+\frac{y}{z}+\frac{z}{x}}$ 2) xyz
3) 1 4) x + y + z

26. If 6, 10, 14 are the sides of a triangle then its obtuse angle is
1) 110° 2) 120° 3) 135° 4) 115°

27. In Δ ABC if a=13, b=14, c=15 then $\mathrm{Tan}\frac{B}{2}=$
1) 3/7 2) $\frac{16}{49}$ 3) 4/7 4) $2/\sqrt{7}$

28. If O is the orthocentre of ΔABC then OA=
1) RCosA 2) 2RCosA
3) 2RCotA 4) RCotA

29. If O is the orthocentre of ΔABC then the distance of O from the side BC is
1) 2R CosB CosC 2) 2R CosC CosA
3) 2R CosA CosB 4) R CosB CosC

30. If the sides of a triangle are $\sqrt{2}, \sqrt{6}, \sqrt{8}$ then the angles of the triangle are
1) 30°, 75°, 75° 2) 45°, 45°, 90°
3) 30°, 60°, 90° 4) 60°, 60°, 60°

31. In ΔABC if the angle A, B, C are in A.P. then $\frac{a+c}{\sqrt{a^2-ac+c^2}}=$
1) $\mathrm{Cos}\left(\frac{A-C}{2}\right)$ 2) $2\mathrm{Cos}\left(\frac{A-C}{2}\right)$
3) $2\mathrm{Sin}\left(\frac{A-C}{2}\right)$ 4) $2\mathrm{Cos}\left(\frac{A+C}{2}\right)$

32. If $c^2 = a^2+b^2$ and 2s = a + b + c, then the value of 4s(s-a) (s-b) (s-c) is
1) s^4 2) b^2c^2 3) c^2a^2 4) a^2b^2

33. If the sides of a triangle are x^2+x+1, $2x+1$ and x^2-1, then the greatest angle is
1) 75° 2) 90° 3) 105° 4) 120°

34. If in a triangle ABC, 3 sin A = 6 sin B = $2\sqrt{3}$ sin C, then the angle A is
1) 30° 2) 45° 3) 60° 4) 90°

35. In triangle ABC, $\frac{1+\cos(A-B)\cos C}{1+\cos(A-C)\cos B}=$
1) $\frac{a^2+b^2}{b^2+c^2}$ 2) $\frac{a^2+b^2}{a^2+c^2}$
3) $\frac{a^2-b^2}{b^2-c^2}$ 4) $\frac{a^2-b^2}{a^2-c^2}$

36. If in a triangle ABC, in the usual notation, $2a\cos\left(\frac{B-C}{2}\right)=b+c$ and $B\neq C$, then the measure of the angle A is
1) $\pi/3$ 2) $\pi/4$ 3) $\pi/6$ 4) $\pi/2$

37. If in a triangle ABC, $a^2+b^2+c^2=ca+ab\sqrt{3}$, then the triangle is
1) equilateral 2) right angled and isosceles
3) right angled with one of the acute angles measuring $\frac{\pi}{3}$ 4) obtuse angled

38. In triangle ABC, a = 4, b = 3 and ∠A = 60°. Then c is a root of the equation [AIEEE - 2002]
1) $c^2-3c+7=0$ 2) $c^2+3c-7=0$
3) $c^2+3c+7=0$ 4) $c^2-3c-7=0$

39. If in triangle ABC, $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}=0$, then cotA+cotB+cotC=
1) $3\sqrt{3}$ 2) $\sqrt{3}$ 3) $1/\sqrt{3}$ 4) $1/3\sqrt{3}$

40. If in triangle ABC, $\frac{2\cos A}{a}+\frac{\cos B}{b}+\frac{2\cos C}{c}=\frac{a}{bc}+\frac{b}{ca}$, then the value of the angle A, in degrees is
1) 30 2) 60 3) 90 4) 120

41. If a=7, b=8, c=9, then $\frac{\tan C}{\tan A}=$
1) 1 2) 2 3) 3 4) 5/4

42. If A = 60°, $\Delta = 10\sqrt{3}$, s=10, then a=
1) 1 2) 3 3) 5 4) 7

43. In a triangle ABC, B = 90°, then the value of $\tan\frac{A}{2}=$
1) $\sqrt{\frac{b+c}{b-c}}$ 2) $\sqrt{\frac{b-c}{b+c}}$ 3) $\sqrt{\frac{a+c}{a-c}}$ 4) $\sqrt{\frac{a-c}{a+c}}$

44. If in ΔABC, A = B - C = 60°, then $\frac{b-c}{b+c}=$
1) 1 2) 1/2 3) 1/3 4) 1/4

45. $\frac{b\cos C+c\cos B}{\cos A}=$
1) $\frac{2abc}{a^2+b^2+c^2}$ 2) $\frac{abc}{b^2+c^2-a^2}$
3) $\frac{abc}{b^2+c^2+a^2}$ 4) $\frac{2abc}{b^2+c^2-a^2}$

46. If Δ is the area of triangle whose sides are a,b,c then the area of the triangle with 2a,2b,2c as the sides is
1) 2Δ 2) 4Δ 3) 8Δ 4) 16Δ

47. In any ΔABC, $\sum\left(\frac{\sin^2A+\sin A+1}{\sin A}\right)$ is always greater than
1) 9 2) 3 3) 27 4) 1/3

48. In any ΔABC, $\Pi\left(\frac{\sin^2A+\sin A+1}{\sin A}\right)$ is always greater than
1) 9 2) 3 3) 27 4) 81

49. The sides of a triangle are in ratio $1:\sqrt{3}:2$, then angles of the triangle are in the ratio
1) 1:2:3 2) 1:3:5 3) 2:3:4 4) 3:2:1

50. In a triangle ABC, $(a+b+c)(b+c-a)=\lambda bc$ if
1) $\lambda<0$ 2) $\lambda>0$ 3) $0<\lambda<4$ 4) $\lambda>4$

51. $\frac{\cos 2A}{a^2}-\frac{\cos 2B}{b^2}=$
1) $\frac{1}{a^2}-\frac{1}{b^2}$ 2) $\frac{1}{a^2}+\frac{1}{b^2}$
3) $\frac{2}{a^2}-\frac{2}{b^2}$ 4) $\frac{2}{a^2}+\frac{2}{b^2}$

52. If a=6, b=8 and c=10 then cos4C+sin4C=
1) 4/5 2) 2/3 3) 1 4) 3/5

53. If $3Tan\frac{A}{2}Tan\frac{C}{2}=1$ then a,b,c are in
1) A.P 2) G.P 3) H.P 4) A.G.P.

54. In a triangle ABC if tan C<0 then C is

1) Acute 2) Obtuse
3) Right angle 4) Acute or obtuse

55. In a triangle ABC if $C = 90^\circ$ then $\left[\frac{a^2+b^2}{a^2-b^2}\right]\sin(A-B) =$

1) 1 2) 2 3) 3 4) 4

PRACTICE SET - II KEY

1) 1	2) 1	3) 2	4) 2	5) 3
6) 2	7) 2	8) 1	9) 3	10) 1
11) 1	12) 1	13) 1	14) 1	15) 1
16) 1	17) 1	18) 2	19) 3	20) 4
21) 3	22) 1	23) 3	24) 2	25) 1
26) 2	27) 3	28) 2	29) 1	30) 3
31) 2	32) 4	33) 4	34) 4	35) 2
36) 1	37) 3	38) 4	39) 2	40) 3
41) 3	42) 1	43) 2	44) 3	45) 4
46) 2	47) 1	48) 3	49) 1	50) 3
51) 1	52) 3	53) 1	54) 2	55) 1

SELF TEST

01. If $a = 30, b = 28$ and $c = 26$ then the value of $\cos\left(\frac{A}{2}\right)$ in ΔABC is

1) $\frac{4}{\sqrt{13}}$ 2) $\frac{3}{\sqrt{13}}$ 3) $\frac{2}{\sqrt{13}}$ 4) $\frac{1}{\sqrt{13}}$

02. In a ΔABC, $b = \sqrt{3}+1, c = \sqrt{3}-1$ and $A = 60^0$ then $(B-C)$ is

1) 45^0 2) 90^0 3) 120^0 4) 150^0

03. In a ΔABC, $a = 5, b = 13, c = 12$ then $\tan\left(\frac{B}{4}\right) =$

1) 1 2) $\sqrt{2}+1$ 3) $\sqrt{2}-1$ 4) $\frac{1}{3}$

04. In a ΔABC, $a\cos^2\left(\frac{B}{2}\right) + b\cos^2\left(\frac{A}{2}\right) =$

1) $\frac{s}{2}$ 2) s 3) 0 4) none

05. In a ΔABC, $\Sigma a^2\left(\cos^2 B - \cos^2 C\right)$ is

1) $\left(a^2-b^2\right)$ 2) $\left(c^2-a^2\right)$
3) 0 4) 1

06. The perimeter of the triangle ABC, given $a = 2\sqrt{3}, b = 4$ and $A = 60^0$ is

1) $6+2\sqrt{3}$ 2) $4+3\sqrt{3}$
3) $9+2\sqrt{3}$ 4) none

07. If $\frac{b}{c^2-a^2} + \frac{a}{c^2-b^2} = 0$ then $\angle C$ is

1) 60^0 2) 120^0 3) 150^0 4) none

08. If R is the circum-radius of the ΔABC then $\frac{a\sin(B-C)}{\sin^2 B - \sin^2 C}$ is

1) $\frac{2}{R}$ 2) $\frac{1}{2R}$ 3) 2R 4) none

09. If $\frac{\sin A}{\sin C} = \frac{\sin(A-B)}{\sin(B-C)}$ then a^2, b^2, c^2 are in

1) A.P. 2) G.P. 3) H.P. 4) none

10. In a ΔABC, $\left[a(b\cos C - c\cos B)\right] =$

1) a^2 2) b^2-c^2 3) 0 4) none

11. The radius of the circum circle of the triangle whose sides are 5 cm, 6 cm, 7 cm, is

1) $\frac{3\sqrt{6}}{2}cm$ 2) $\frac{9}{\sqrt{2}}cm$
3) $\frac{35}{4\sqrt{6}}cm$ 4) $2\sqrt{6}cm$

12. In a ΔABC, $\Sigma a^2\left(\sin^2 B - \sin^2 C\right) =$

1) $2\left(a^2b^2+b^2c^2+c^2a^2\right)$ 2) $2\left(a^2+b^2+c^2\right)$
3) 0 4) none

13. In a ΔABC, if $a = 3, b = 4, c = 5$, then the value of $\sin 2B$ is

1) $\frac{24}{25}$ 2) $\frac{25}{24}$ 3) $\frac{1}{25}$ 4) none

14. In a triangle ABC, $a = 13, b = 14, c = 15$. Then the length of the altitude from A is

1) $\frac{65}{8}$ 2) $\frac{55}{8}$ 3) $\frac{45}{8}$ 4) none

15. If $\cot\frac{A}{2} : \cot\frac{B}{2} : \cot\frac{C}{2} = 1:4:15$ then the greatest angle is

1) 120^0 2) 100^0 3) 90^0 4) 75^0

16. If a, b, c are in A.P. the value of $\tan\left(\frac{A}{2}\right) \cdot \tan\left(\frac{C}{2}\right) =$

1) $\frac{1}{3}$ 2) 3 3) $\frac{1}{2}$ 4) 2

17. If $\cos A + 2\cos B + \cos C = 2$, then the sides are in

1) A.P. 2) H.P. 3) G.P. 4) none

18. In a ΔABC, the value of $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3} =$

1) $\frac{1}{r}$ 2) $\frac{1}{R}$ 3) $\frac{r}{R}$ 4) Rr

19. In a Δ if r_1, r_2, r_3 are in H.P. then a, b, c are in

1) A.P. 2) G.P. 3) H.P. 4 none

20. $r + r_1 + r_2 - r_3 =$

1) $4R\cos B$ 2) $4R\sin C$
3) $4R\sin B$ 4) $4R\cos C$

21. If A, A_1, A_2, A_3 are the areas of in-circle and ex-circles of a triangle then $\frac{1}{\sqrt{A_1}}+\frac{1}{\sqrt{A_2}}+\frac{1}{\sqrt{A_3}} =$

1) $\frac{1}{\sqrt{A}}$ 2) $\frac{1}{\sqrt{A_1 A_2 A_3}}$
3) $\frac{1}{A\sqrt{A_1 A_2 A_3}}$ 4) none

22. $a\cot A + b\cot B + c\cot C =$

1) $r+R$ 2) $r-R$
3) $2(r+R)$ 4) $2(r-R)$

23. If P_1, P_2, P_3 are the length of the altitudes in a triangle then $\frac{1}{P_1}+\frac{1}{P_2}+\frac{1}{P_3} =$

1) $\frac{1}{P}$ 2) $\frac{1}{P_1P_2P_3}$ 3) $\frac{1}{r}$ 4) r

24. In a ΔABC, $\cos^2\left(\frac{A}{2}\right)+\cos^2\left(\frac{B}{2}\right)+\cos^2\left(\frac{C}{2}\right)$

1) $1+\frac{r}{2R}$ 2) $2+\frac{r}{2R}$ 3) $3+\frac{r}{2R}$ 4) none

25. In an equilateral triangle the in-radius and circum-radius are connected by

1) $r = 4R$ 2) $r = \frac{R}{2}$ 3) $r = \frac{R}{3}$ 4) none

SELF TEST KEY

1) 2	2) 2	3) 3	4) 2	5) 3
6) 1	7) 1	8) 3	9) 1	10) 3
11) 3	12) 3	13) 1	14) 4	15) 1
16) 1	17) 1	18) 1	19) 1	20) 4
21) 1	22) 3	23) 3	24) 2	25) 2

PREVIOUS EAMCET QUESTIONS

01. If a = 2, b= 3, c = 4, then cos A= [1985]

1) 7/8 2) 5/7 3) 6/7 4) 5/8

02. The smallest angle of the triangle whose sides are $6+\sqrt{12},\sqrt{48},\sqrt{24}$ is [1985]

1) $\pi/3$ 2) $\pi/4$ 3) $\pi/6$ 4) $2\pi/3$

03. If $c^2 = a^2 + b^2, 2s = a + b + c$, then $4s(s-a)(s-b)(s-c)$ [1986]

1) s^4 2) b^2c^2 3) c^2a^2 4) a^2b^2

04. In an equilateral triangle $r : R : r_1$ is [1986]

1) 1 : 1 :1 2) $1 : \sqrt{2} : 3$

3) 1 : 2 : 3 4) $2 : \sqrt{3} : \sqrt{3}$

05. If $x^2+x+1, 2x+1, x^2-1$ are the sides of a triangle, then its largest angle is [1987]

1) $\pi/3$ 2) $\pi/4$ 3) $\pi/6$ 4) $2\pi/3$

06. The diameter of the circumcircle of the triangle whose sides 61,60,11 is [1988]

1) 61 2) 60 3) 11 4) 50

07. $\sum a^3 \cos(B-C) =$ [1989]

1) 0 2) abc 3) 3abc 4) 1

08. If $a^2+b^2+c^2 = 8R^2$, then the triangle is [1990]

1) right angled 2) isosceles

3) equilateral 4) none

09. If a =2, B = 120°, C = 30°, then the area of the triangle is [1990]

1) $2\sqrt{3}$ 2) $\sqrt{3}$ 3) $\sqrt{3}/2$ 4) $4\sqrt{3}$

10. If $a=\sqrt{3}+1, B=30°, C=45°$, then c = [1991]

1) 2 2) 3 3) 4 4) 1

11. If $\tan\frac{A}{2}=\frac{5}{6}, \tan\frac{C}{2}=\frac{2}{5}$ then [1994]

1) a,c,b are in A.P. 2) a,b,c are in A.P.

3) b,a,c are in A.P. 4) a,b,c are in G.P.

12. If $\cot\frac{A}{2}=\frac{b+c}{a}$, then the triangle is [1994]

1) isosceles 2) equilateral

3) right angled 4) none

13. $\sum a^2(\cos^2 B - \cos^2 C) =$ [1995]

1) 0 2) 1 3) 2 4) 3

14. If A = 60° then $\frac{b}{c+a}+\frac{c}{a+b}=$ [1997]

1) 1 2) 2 3) 3 4) 4

15. If the sides of a triangle ABC are 6,8,10 unit, then the radius of its circumcircle is [1997]

1) 4 2) 3 3) 6 4) 5

16. If C = 60° then $\frac{a}{b+c}+\frac{b}{c+a}=$ [1998]

1) 2 2) 4 3) 3 4) 1

17. $r+r_3+r_1-r_2=$ [2000]

1) 4R cos A 2) 4R cos B

3) 4R cos C 4) 4R

18. If a,b,c are in A.P., then $\tan\frac{A}{2}\tan\frac{C}{2}=$ [2000]

1) 1/4 2) 1/3 3) 3 4) 4

19. $\frac{a}{b^2-c^2}+\frac{c}{b^2-a^2}=0$ then B= [2011]

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{4}$ 3) $\frac{2\pi}{3}$ 4) $\frac{\pi}{3}$

20. $\frac{\cos C+\cos A}{c+a}+\frac{\cos B}{b}=$ [2001]

1) $\frac{1}{a}$ 2) $\frac{1}{b}$ 3) $\frac{1}{c}$ 4) $\frac{c+a}{b}$

21. The altitudes of a triangle are in arithmetic progression, then the sides of the triangle are in [2002]

1) AP 2) HP 3) GP 4) AGP

22. In DABC, if b = 20, c = 21 and sinA = 3/5 then a = [2003]

1) 12 2) 13 3) 14 4) 15

23. In DABC, if b + c = 3a then $\cot\frac{B}{2}.\cot\frac{C}{2}=$ [2003]

1) 1 2) 2 3) 3 4) 4

24. In a DABC, a = 2b and $|A-B|=\frac{\pi}{3}$, then ∠C is

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{3}$

25. In a DABC, [2005]

$a(\cos^2 B+\cos^2 C)+\cos A(c\cos C+b\cos B)$

1) a 2) b 2) c 4) a + b + c

26. In a DABC, $\Sigma(b+c)\tan\frac{A}{2}\tan\left(\frac{B-C}{2}\right)=$ [2005]

1) a 2) b 2) c 4) 0

27. Two sides of a triangle are given by the roots of the equation $x^2 - 5x + 6 = 0$ and the angle between the sides is p/3. Then the perimeter of the triangle is [2005]

1) $5+\sqrt{2}$ 2) $5+\sqrt{3}$

3) $5+\sqrt{5}$ 4) $5+\sqrt{7}$

PREVIOUS EAMCET KEY

1) 1	2) 3	3) 4	4) 3	5) 4
6) 1	7) 3	8) 1	9) 2	10) 1
11) 2	12) 3	13) 1	14) 1	15) 4
16) 4	17) 2	18) 2	19) 4	20) 2
21) 2	22) 2	23) 2	24) 4	25) 1
26) 4	27) 4			

SPACE FOR IMPORTANT NOTES

COMPLEXNUMBERS

SYNOPSIS

- N= natural number set
  z= integer set
  Q= Rational number set
  R= real numbers set
  C= complex numbers set
  then $N \subset z \subset Q \subset R \subset C$
- $z = x + iy$ x, y are real numbers and $i = \sqrt{-1}$, then z is called complex number
  here x is called real part and
  y is called imaginary part.
- In the complex number $z = x + iy$ if $x=0$, then z is called purely imaginary number
  If $y=0$, then z is called purely real number.
- In the complex number $z = x + iy$,
  - If $x=0$, then z lie on y- axis or imaginary axis
  - If $y=0$ then z lie on x axis or real axis
  - If $x>0, y>0$ then z lies in the quardant induced by positive real and positive imaginary axis.
- Let $z_1 = x_1 + iy_1; z_2 = x_2 + iy_2$ be two complex numbers then
  - $z_1 + z_2 = x_1 + x_2 + i(y_1 + y_2)$
  - $z_1 - z_2 = x_1 - x_2 + i(y_1 - y_2)$
  - $z_1 z_2 = (x_1 x_2 - y_1 y_2) + i(x_1 y_2 + x_2 y_1)$
  - $-z_1 = -x_1 - iy_1$
  - $z_1 = z_2$ if $x_1 = x_2$ and $y_1 = y_2$
  - $z_1 + z_2 = z_2 + z_1$
  - $z_1 z_2 = z_2 z_1$
- z_1, z_2, z_3 are complex numbers then
  $z_1(z_2 + z_3) = z_1 z_2 + z_1 z_3$
- **Conjugate complex number:**
  If $z = x + iy$ is a complex number then $\bar{z} = x - iy$ is called conjugate complex number of z. Here $z, \bar{z}$ are conjugate complex of one another. The conjugate complex of purely real number is the number itself.
- If $z, \bar{z}$ are conjugate complex numbers then $z + \bar{z}$, $z\bar{z}$ are purely real numbers.
- If z_1, z_2 are complex numbers then
  - $\overline{z_1 + z_2} = \bar{z}_1 + \bar{z}_2$
  - $\overline{\left(\dfrac{z_1}{z_2}\right)} = \dfrac{\bar{z}_1}{\bar{z}_2}$
  - $z + \bar{z} = 2\operatorname{Re}(z)$
  - $z - \bar{z} = 2i\operatorname{Im}(z)$
  - $z\bar{z} = a^2 + b^2 = |z|^2$
- **Modulus or absolute value of a complex number:**
  If $z = x + iy$ is a complex number then $|z| = \sqrt{x^2 + y^2}$ is called absolute value of z.
  Also $z = (x + iy)$ is denoted as a point $p(x, y)$ in the argand plane then OP= $\sqrt{x^2 + y^2}$ is the distance of p from origin will be the modulus of the complex number.
  Also $|z| = |-z| = |\bar{z}| = |-\bar{z}|$
- If z_1, z_2 are two complex numbers then
  - $|z_1 z_2| = |z_1||z_2|$
  - $\left|\dfrac{z_1}{z_2}\right| = \dfrac{|z_1|}{|z_2|}$
  - $|z_1 + z_2| \le |z_1| + |z_2|$
  - $|z_1 - z_2| \le |z_1| + |z_2|$
  - $|z_1 - z_2| \ge |z_1| - |z_2|$
  - $|z_1 - z_2| \ge \big||z_1| + |z_2|\big|$
- If $a + ib > c + id$ or $a + ib < c + id$, if and only if $b = d = 0$
- **Argument of a complex number:**
- **Principal argument:** Let p be the point which represent complex number z in Argand plane then the angle made by OP with x-axis in anti clock direction is called the principal argument of z if $-\pi < \theta \le \pi$.
- **General argument:** If θ is the principal argument of the complex number z then $2k\pi + \theta, k \in z$ is the general argument of z.
  Note: For a non zero complex number the principal argument is unique, where as the general arguments are infinitely many.

S.n Complex Number	Place of the complex number	Principal argument	General argument
$x + iy$; $x, y > 0$	IQ	$\tan^{-1}\dfrac{x}{y}$	$2k\pi + \tan^{-1}\dfrac{x}{y}$
$-x + iy$; $x > 0, y > 0$	IIQ	$\pi - \tan^{-1}\dfrac{y}{x}$	$(2k+1)\pi - \tan^{-1}\dfrac{y}{x}$, $k \in z$
$-x - iy$; $x > 0, y > 0$	IIIQ	$-\pi + \tan^{-1}\dfrac{y}{x}$	$(2k-1)\pi + \tan^{-1}\dfrac{y}{x}$, $k \in z$
$x - iy$; $x > 0, y > 0$	IV Q	$-\tan^{-1}\left(\dfrac{y}{x}\right)$	$2k\pi - \tan^{-1}\dfrac{y}{x}$, $k \in z$
$x + iy$; $x > 0, y = 0$	Positive x-axis	0	$2k\pi$, $k \in z$
$x + iy$; $x < 0, y = 0$	Negative x-axis	π	$2k\pi + \pi$, $k \in z$
$x + iy$; $x = 0, y > 0$	Positive y-axis	$\dfrac{\pi}{2}$	$2k\pi + \dfrac{\pi}{2}$, $k \in z$
$x + iy$; $x = 0, y < 0$	Negative y-axis	$-\dfrac{\pi}{2}$	$2k\pi - \dfrac{\pi}{2}$, $k \in z$

- If z_1, z_2 are two complex numbers such that $z_2 \ne 0$ then
  - $\arg z_1 z_2 = \arg z_1 + \arg z_2$
  - $\arg \dfrac{z_1}{z_2} = \arg z_1 - \arg z_2$
  - $\arg z_1 + \arg \bar{z}_1 = 0$ or π
- Principle mod amplitude form of a complex numbers. Let $z = x + iy$ be a complex number then $|z| = \sqrt{x^2 + y^2}$. If θ in the principal amplitude of z then $z = r(\cos\theta + i\sin\theta) = r cis\theta$,
  $-\pi < \theta \le \pi$ is called principal amplitude form of z.
- General mod amp. form of a complex number:
  Let $z = x + iy$ be a complex number. If $z = x + iy$; $z = r cis\theta$ is the principal mod amp form of z then $r cis(2k\pi + \theta)$, $k \in z$ is the general amplitude form of z.
- $\sqrt{a + ib} =$
  $\pm\left[\sqrt{\dfrac{\sqrt{a^2 + b^2} + a}{2}} + i\sqrt{\dfrac{\sqrt{a^2 + b^2} - a}{2}}\right]$ If $b > 0$

$= \pm\left[\sqrt{\frac{\sqrt{a^2+b^2}+a}{2}} - i\sqrt{\frac{\sqrt{a^2+b^2}-a}{2}}\right]$ If $b<0$

- If $\sqrt{a+ib} = \pm(x+iy)$ then $\sqrt{a-ib} = \pm(x-iy)$
- If z is a complex number then $|\text{Re}\, z| \le |z|$ and $|\text{Im}\, z| \le |z|$
- If z is a non zero complex number then
  - $\log z = \log|z| + i\arg z$ or $\log z = \log|z| + i(\arg z + 2k\pi)$, k is an integer
- If the amplitude of complex number z is
  - $0 \Rightarrow$ locus of z is $y=0$ and $x>0$
  - $\frac{\pi}{2} \Rightarrow$ locus of z is $x=0$ and $y>0$
  - $\pi \Rightarrow$ locus of z is $y=0$ and $x<0$
  - $-\frac{\pi}{2} \Rightarrow$ locus of z is $y<0$ and $x=0$
  - Product of nth roots of unity $= (-1)^{n-1}$
  - The nth roots of unity are in G.P with common ratio $cis\frac{2\pi}{n}$
  - Modulus of each of nth roots of unity in 1 and all the nth roots of unity lie on unit circle centre at origin and they are equal spaced at the centre of the circle with angular distance $\frac{2\pi}{n}$ radians.
- The cube roots of unity are $1, \omega, \omega^2$.
  - sum of cube roots of unity $= 1+\omega+\omega^2 = 0$
  - Product of $1.\omega.\omega^2 = \omega^3 = 1$.
- The fourth roots of unity are $1, -1, i, -i$.
  - sum of 4th roots of unity is 0
  - product of 4th roots of unity is $= -1$
- Centroid of Δ ABC when $A(z_1), B(z_2), C(z_3)$ is $\frac{z_1+z_2+z_3}{3}$.
- The roots of $x^2+x+1=0$ are ω and ω^2.
- If $\cos\theta + i\sin\theta = e^{i\theta}$ then $\cos\theta - i\sin\theta = e^{-i\theta}$
- $e^{i\alpha}.e^{i\beta}.e^{i\gamma} = e^{i(\alpha+\beta+\gamma)} = cis(\alpha+\beta+\gamma)$

SOLVED EXAMPLES

1. $\sqrt{-3}\times\sqrt{-5} =$

1) $\sqrt{15}$ 2) $-\sqrt{15}$ 3) $\sqrt{15}i$ 4) $-\sqrt{15}i$

Sol: $\sqrt{-3}\times\sqrt{-5} = \sqrt{3}i\times\sqrt{5}i = \sqrt{15}i^2 = -\sqrt{15}$

Ans : 2

2. Conjugate of $3+4i$

1) $-3-4i$ 2) $3+4i$ 3) $3-4i$ 4) None

Sol: Conjugate of $a+ib = a-ib$

$\therefore$ conjugate of $3+4i = 3-4i$

Ans : 3

3. $z = 3-4i \Rightarrow |z| =$

1) 3 2) 4 3) 5 4) 6

Sol: $|z| = \sqrt{a^2+b^2}$

$\sqrt{3-4i} = \sqrt{3^2+4^2} = 5$

Ans : 3

4. $z = \frac{1+i}{1-i}$ express in the forms of $a+ib$

1) $1+i$ 2) $1-i$ 3) $i1$ 4) 1

Sol: $z = \frac{1+i}{1-i}\times\frac{1+i}{1+i} = \frac{(1+i)^2}{1-i^2}$

$= \frac{1+2i+i^2}{1+1} = \frac{1-1+2i}{2} = i1$

Ans : 3

5. Find the modulus of $\frac{7-24i}{3+4i}$

Sol: $\left|\frac{7-24i}{3+4i}\right| = \frac{|7-24i|}{|3+4i|}$

$= \frac{\sqrt{7^2+(-24)^2}}{\sqrt{3^2+4^2}} = \frac{25}{5} = 5$

Ans : 3

6. Additive inverse of $3-7i$ is

1) $3+7i$ 2) $-3+7i$ 3) $-3-7i$ 4) None

Sol: Additive inverse of $a+ib = -a-ib$

Additive inverse of $3-7i$ is

$= -3+7i$

Ans : 2

07. i^{243}

1) 1 2) i 3) -1 4) -i

Sol: $i^{243} = (i^2)^{121}.i$

$= (-1)^{121}.i = (-1)i = -i$

Ans : 4

08. Express $1+i\sqrt{3}$ in the modulus amplitude form

1) $\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}$ 2) $2\left[\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right]$

3) $3\left[\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right]$ 4) $4\left[i\sin\frac{\pi}{3}\right]$

Sol: Modulus amplitude form of $a+ib$

$= r[\cos\theta + i\sin\theta]$

$\therefore$ Given $1+i\sqrt{3}$

$r = \sqrt{1^2+(\sqrt{3})^2} = \sqrt{4} = 2$

$\theta = \tan^{-1}\left[b/a\right] = \tan^{-1}\left[\frac{\sqrt{3}}{1}\right] = \frac{\pi}{3}$

$\therefore$ Modulus amplitude form of $1+i\sqrt{3}$ is

$2\left[\cos\pi/3 + i\sin\pi/3\right]$. **Ans : 2**

09. Argument of $1+i$ is

1) π 2) $\pi/4$ 3) $\pi/2$ 4) $\pi/3$

Sol: Argument $\theta = \tan^{-1}\left[\frac{b}{a}\right]$

$= \tan^{-1}\left[\frac{1}{1}\right] = \tan^{-1}1 = \frac{\pi}{4}$ **Ans : 2**

10. If m_1, m_2, m_3 respectively denote the moduli of the complex numbers $1+4i, 3+i, 1-i$ then

1) $m_1 < m_2 < m_3$ 2) $m_1 > m_2 > m_3$

3) $m_3 < m_2 < m_1$ 4) $m_3 < m_1 < m_2$

Sol: $m_1 = |1+4i| = \sqrt{1^2+4^2} = \sqrt{17}$

$m_2 = |3+i| = \sqrt{3^2+1^2} = \sqrt{10}$

$m_3 = |1-i| = \sqrt{1^2+(-1)^2} = \sqrt{2}$

$\therefore m_3 < m_2 < m_1$ **Ans : 3**

11. The conjugate of a complex number is $\frac{1}{i-1}$. Then that complex number is

1) $\frac{1}{i+1}$ 2) $\frac{-1}{i+1}$ 3) $\frac{1}{i-1}$ 4) $\frac{-1}{i-1}$

Sol: $\bar{z} = \frac{1}{i-1}$

$z = \frac{1}{-i-1} = \frac{-1}{i+1}$ **Ans : 2**

12. Find the square root of $3+4i$

1) $+(2+i)$ 2) $-(2+i)$ 3) $\pm(2+i)$ 4) None

Sol: $\sqrt{3+4i} = \pm\left[\sqrt{\frac{\sqrt{3^2+4^2}+3}{2}} + i\sqrt{\frac{\sqrt{3^2+4^2}-3}{2}}\right]$

$= \pm(2+i)$ **Ans : 3**

13. $z_1 = 3+4i, z_2 = 2+i$ then $\overline{z_1+z_2}$

1) 5 2) $5-5i$ 3) $5i$ 4) None

Sol: $z_1 = 3+4i$

$z_2 = 2+i$

$\overline{z_1+z_2} = \bar{z}_1+\bar{z}_2 = 3-4i+2-i = 5-5i$

Ans : 2

PRACTICE SET - I

01. $i^{[illegible]} =$
1) i 2) $-i$ 3) 1 4) -1

02. $\left|\frac{(3+i)(2-i)}{1+i}\right| =$
1) $\sqrt{5}$ 2) $5\sqrt{2}$ 3) $\sqrt{10}$ 4) 5

03. $i^{57}+\frac{1}{i^{125}} =$
1) 0 2) $2i$ 3) $-2i$ 4) 2

04. If $\sqrt{2i}=1+ai$ then a=
1) 4 2) 3 3) 2 4) 1

05. The value of $i^2+i^4+i^6+---(2n+1)$ terms=
1) 0 2) -1 3) $3i$ 4) $4i$

6. $(1+i+i^2+i^3+i^4+i^5)(1+i)=$
1) i 2) $2i$ 3) $3i$ 4) $4i$

7. If $2i^2+6i^3+3i^{16}-6i^{19}+4i^{25}=x+iy$ then $(x,y)=$
1) $(1,4)$ 2) $(4,-1)$
3) $(-1,4)$ 4) $(-1,-4)$

8. The simplified value of $\frac{1+i}{1-i}$ is
1) 1 2) i 3) $-i$ 4) $2i$

09. $i+\frac{1}{i}=$
1) 1 2) -1 3) 0 4) $2i$

10. The real part of $\left(\frac{1+i}{3-i}\right)^2 =$
1) 16 2) -16 3) $16w^2$ 4) $\frac{-3}{25}$

11. If $n=4m+3$, m integer, then i^n is equal to
1) i 2) -1 3) -i 4) 1

12. The simplified value of $\frac{1-i}{1+i}$ is
1) i 2) -i 3) 1 4) -2i

13. $\left(\frac{1+i}{1-i}\right)^{4n+1} =$
1) i 2) -i 3) 1 4) -1

14. If $\left(\frac{1+i}{1-i}\right)^3-\left(\frac{1-i}{1+i}\right)^3=A+iB$ then A,B are
1) 0,2 2) 0,-2 3) 2,0 4) -2,0

15. The value of $\left(\frac{1-i}{1+i}\right)^{10}+\left(\frac{1+i}{1-i}\right)^8=$
1) 0 2) 2i 3) i 4) -i

16. Let n be a positive integer. Then $(i)^{4n+1}+(-i)^{4n+5}=$
1) 0 2) 2i 3) i 4) -i

17. The conjugate of $z+2\bar{z}$ is
1) $2\bar{z}+z$ 2) $\bar{z}+2z$ 3) $\bar{z}-2z$ 4) $\bar{z}-z$

18. If $z=3-4i$ t
1) $z-\bar{z}=-8$ (2) $\frac{1}{z}=\bar{z}$
3) $z^2=+7-24i$ 4) $z\bar{z}=25$

19. Let z complex number. If $z\bar{z}=0$ then
1) Rez=0 2) Imz=0
3) Rez+Imz=0 4) z=0

20. If z is a complex number then $z+\bar{z}=$
1) Re z 2) 2. Re z
3) Im z 4) 2.Im z

21. $\sqrt{-3}\sqrt{-75}=$
1) 15 2) 15i 3) -15 4) 115i

22. The additive inverse of z is
1) 0 2) z 3) -z 4) z

23. The multiplicative inverse of z
1) $\frac{z}{|z|^2}$ 2) $\frac{\bar{z}}{|z|^2}$ 3) $\frac{\bar{z}}{|z|}$ 4) $\frac{\bar{z}^2}{|z|}$

24. The multiplicative inverse of 3 - 4i
1) 3 + 4 i 2) $\frac{3+4i}{5}$
3) $\frac{3-4i}{25}$ 4) $\frac{3+4i}{25}$

25. If z is a unimodular complex number then its multiplicative inverse is,
1) $\bar{z}$ 2) z 3) -z 4) $-\bar{z}$

26. If $(x+iy)(2-3i)=4+i\left(\frac{1}{2}\right)$ then x + y=
1) 3/2 2) 1/2 3) 0 4) 2/3

27. The real and imaginary parts of $\frac{a+ib}{a-ib}$ are
1) $a^2-b^2;2ab$ 2) $\frac{a^2+b^2}{a^2-b^2},\frac{2ab}{a^2-b^2}$
3) $\frac{a^2-b^2}{a^2+b^2},\frac{2ab}{a^2+b^2}$ 4) $\frac{a^2+b^2}{a^2-b^2},\frac{2ab}{a^2-b^2}$

28. If $(a_1+ib_1)(a_2+ib_2)---(a_n+ib_n)=A+iB$ then $(a_1^2+b_1^2)(a_2^2+b_2^2)---(a_n^2+b_n^2)=$
1) A^2-B^2 2) A^2+B^2
3) $A-B$ 3) $A+B$

29. If $\frac{(a_1+ib_1)(a_2+ib_2)------}{(a_n+ib_n)=A+iB}$ then
$\tan^{-1}\frac{b_1}{a_1}+\tan^{-1}\frac{b_2}{a_2}+........+\tan^{-1}\frac{b_n}{a_n}=$
1) $n\pi$ 2) $n\pi+\tan^{-1}\frac{b_2}{a_2}+....+\tan^{-1}\frac{b_n}{a_n}$
3) $n\pi+\tan^{-1}\frac{B}{A}$ 4) $\tan^{-1}\frac{B}{A}$

30. If $z=-1+3i$ then $z^2+2z+10=$
1) 0 2) 1 3) -1 4) 2

31. $(z-1)(\bar{z}-1)$ can be written as
1) $z\bar{z}+1$ 2) $|z-1|^2$
3) $|z|^2+1$ 4) $|z|^2+2$

32. if $(5+3i)(x+iy)=3-4i$ then $34x=$
1) 1 2) 2 3) 3 4) 4

33. The points 9 + i, 4 + 13i, -8 + 8i, -3-4i in the Argand diagram represent a
1) rhombus 2) square
3) rectangle 4) parallelogram

34. If z is nonzero complex number then $\frac{\bar{z}}{|z|^2}=$
1) $\frac{1}{z}$ 2) $\frac{1}{z}$ 3) $-\frac{1}{z}$ 4) $-\frac{1}{|z|}$

35. If $z=\bar{z}$ then
1) z is real
2) $\bar{z}$ is purely imaginary
3) z is any complex number
4) Zero

36. If $z+\bar{z}=0$ then
1) Re (z) = 0 2) Im (z) = 0
3) Re(z) = Im(z) = 0
4) Im(z) = Re(z)

37. The integral solution of $(1-i)^x=2^x$ is
1) x = 1 2) x = -1 3) x = 2 4) x = 0

38. If $\left(\sqrt{3}+i\right)^{100}=2^{99}(a+ib)$ then b =
1) $\sqrt{3}$ 2) 1 3) $2\sqrt{3}$ 4) 0

39. The sum of two complex numbers a + ib and c + id is a real number if
1) a + c = 0
2) b + d = 0
3) a + b = 0
4) b + c = 0

40. The sum of two complex numbers a+ ib and c+ id is purely imaginary if

1) $a+c=0$ 2) $a+d=0$
3) $b+d=0$ 4) $b+c=0$

41. $\sqrt{8-6i}=$

1) $3-4i$ 2) $3-2i$ 3) $3-i$ 4) $3+4i$

42. If $\bar{z}=\frac{-1-i\sqrt{3}}{2}$ then $\sqrt{\bar{z}}$

1) z 2) -z 3) $-\bar{z}$ 4) $\sqrt{3}+i$

43. The Values of $\sqrt{7-24i},\sqrt{-7+24i},\sqrt{-7-24i},\sqrt{7+24i}$, in this order are

1) $\pm(4-3i),\pm(3+4i),\pm(4+3i),\pm(-3+4i)$,
2) $\pm(4-3i),\pm(3+4i),\pm(-3+4i),\pm(4+3i)$,
3) $\pm(4-3i),\pm(-3+4i),\pm(3+4i),\pm(4+3i)$,
4) $\pm(4-3i),\pm(4+3i),\pm(-3+4i),\pm(3+4i)$,

44. If $x+iy=\sqrt{\frac{3+4i}{5+2i}}$ then $169\left(x^2+y^2\right)^2=$

1) 5 2) 3 3) 25 4) 50

45. $\sqrt{4+3\sqrt{20i}}+\sqrt{4-3\sqrt{20i}}=$

1) 6 2) 3 3) 4 4) 2

46. Square root of i is

1) $\pm(1-i)$ 2) $\pm(2-i)$
3) $\pm\frac{(1+i)}{\sqrt{2}}$ 4) $\pm(1+i)$

47. The modulus of $(1+i)(3+4i)=$

1) $\sqrt{50}$ 2) $\sqrt{25}$ 3) $\sqrt{25}$ 4) $-5/\sqrt{2}$

48. The principal argument of $z=-3+3i$

1) $\frac{\pi}{4}$ 2) $-\frac{\pi}{4}$ 3) $\frac{3\pi}{4}$ 4) $-\frac{3\pi}{4}$

49. If $|z|=2$, Arg $z=\frac{\pi}{6}$ then z=

1) $\sqrt{3}-i$ 2) $\sqrt{3}+i$
3) $1+\sqrt{3}i$ 4) $1-\sqrt{3}i$

50. Argument of $\frac{1+i}{1+\sqrt{3}i}=$

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{3}$ 3) $\frac{-\pi}{12}$ 4) $\frac{\pi}{2}$

51. Amplitude of $\frac{1+i}{1-i}$ is,

1) 0 2) π 3) $\frac{\pi}{2}$ 4) $-\pi$

52. The principal value of the argument of $-\sqrt{3}+i$ is

1) $\frac{\pi}{6}$ 2) $\frac{3\pi}{6}$ 3) $\frac{5\pi}{6}$ 4) $\frac{7\pi}{6}$

53. For a < o, arg (ia) is

1) $\frac{\pi}{2}$ 2) $-\frac{\pi}{2}$ 3) π 4) $-\pi$

54. If arg $z=\theta$ then arg $\left(\frac{1}{z}\right)=$

1) θ 2) $-\theta$ 3) $\frac{\theta}{2}$ 4) $\frac{\theta}{4}$

55. If $|z|=4$, arg $z=\frac{5\pi}{6}$ then z

1) $\sqrt{3}+i$ 2) $-\sqrt{3}+i$
3) $2(\sqrt{3}+i)$ 4) $2(-\sqrt{3}+i)$

56. The mod - amp form of $-1-\sqrt{3}i$ is

1) $cis\left(\frac{2\pi}{3}\right)$ 2) $2cis\left(-\frac{2\pi}{3}\right)$
3) $cis\left(\frac{-2\pi}{3}\right)$ 4) $2cis\left(\frac{2\pi}{3}\right)$

57. The modulus amplitude form of $1+i\tan\theta$ is

1) $\sec\theta cis\theta$ 2) $cis\theta$
3) $\sec\theta cis\left(\frac{\pi}{2}-\theta\right)$
4) $\sec\theta . cis\left(\frac{3\pi}{2}-\theta\right)$

58. The mod - amp form of $1-i\sqrt{2}$ is

1) $\sqrt{3}cis\left(\tan^{-1}\left(\sqrt{2}\right)\right)$ 2) $cis\left(\tan^{-1}\left(-\sqrt{2}\right)\right)$
3) $\sqrt{3}cis\left(\tan^{-1}\left(-\sqrt{2}\right)\right)$ 4) $cis\left(\tan^{-1}(2)\right)$

59. The mod- amp form of -4i is

1) $cis\frac{\pi}{2}$ 2) $2cis\frac{\pi}{2}$
3) $3cis\frac{\pi}{2}$ 4) $4cis\left(\frac{-\pi}{2}\right)$

60. If $|z_1+z_2|=|z_1-z_2|$ then the difference between the arguments of z_1 and z_2 is

1) 0 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{4}$

61. If arg $z_1=\frac{\pi}{2}$, arg $\bar{z}_2=\frac{\pi}{4}$, then arg $\left(\frac{z_1}{z_2}\right)=$

1) $\frac{\pi}{4}$ 2) $-\frac{\pi}{2}$ 3) $-\frac{\pi}{4}$ 4) $\frac{3\pi}{4}$

62. If $z_1=-1, z_2=-i$, then arg (z_1z_2)=

1) $-\pi$ 2) $-\frac{\pi}{2}$ 3) $\frac{3\pi}{2}$ 4) $\frac{\pi}{2}$

63. $amp\ z+amp\ \bar{z}=$

1) 0 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{4}$ 4) $\frac{-3\pi}{4}$

64. If $z=-1+i\sqrt{3}$ then

1) $\bar{z}=-i\sqrt{3}+1$ 2) $|z|=2$
3) arg $z=\frac{-2\pi}{3}$ 4) $\frac{z}{\bar{z}}=\left[-\frac{1-i\sqrt{3}}{2}\right]$

65. For a > o, arg (ia) =

1) $\frac{\pi}{2}$ 2) $-\frac{\pi}{2}$ 3) π 4) $-\pi$

66. For $a<0$, arg a=

1) $\frac{\pi}{2}$ 2) $\frac{-\pi}{2}$ 3) π 4) $-\pi$

67. arg ω + arg ω^2=

1) 0 2) 1 3) 2 4) 3

68. If $|z_1+z_2|=|z_1|+|z_2|$ then $|Argz_1-Argz_2|=$

1) $\frac{\pi}{2}$ 2) $\frac{-\pi}{2}$ 3) π 4) $-\pi$

69. $\log(a+ib)$=

1) $\log\sqrt{a^2+b^2}$
2) $\frac{1}{2}\log\left(a^2+b^2\right)+i\tan^{-1}\left(\frac{b}{a}\right)$
3) $\frac{1}{2}\log\left(a^2+b^2\right)-i\tan^{-1}\left(\frac{b}{a}\right)$
4) $\frac{1}{2}\log\left(a^2+b^2\right)+i\tan^{-1}\left(\frac{a}{b}\right)$

70. Let m be a Positive real number then log (-m)=

1) $\log m+i\frac{\pi}{2}$ 2) $\log m-i\frac{\pi}{2}$
3) $\log m+i\pi$ 4) $\log m-i\pi$

71. Let m be a positive real number then log (mi) =

1) $\log m+i\frac{\pi}{2}$ 2) $\log m+i\pi$
3) $\log m-i\pi$ 4) $\log m-i\frac{\pi}{2}$

72. Let m be a positive integer then log $(-mi)$=

1) $\log m-i\pi$ 2) $\log m-i\frac{\pi}{2}$
3) $\log m+i\pi$ 4) $\log m+i\frac{\pi}{2}$

73. $\log(\log i) =$

1) $\log\frac{\pi}{2}$ 2) $\log i\frac{\pi}{2}$

3) $\log\frac{\pi}{2}+\frac{i\pi}{2}$ 4) $\log\frac{\pi}{2}-i\frac{\pi}{2}$

74. $\log(\log(-i))=$

1) 0 2) $\log\frac{\pi}{2}+i\frac{\pi}{2}$

3) $\log\frac{\pi}{2}-i\frac{\pi}{2}$ 4) $-\log\frac{\pi}{2}+\frac{i\pi}{2}$

75. $\log\left(\frac{1+i}{1-i}\right)=$

1) $-\frac{i\pi}{2}$ 2) $\frac{\pi}{2}$ 3) $-\frac{\pi}{2}$ 4) $i\frac{\pi}{2}$

76. $\log(1+i)^{12}=$

1) $\log\frac{\pi}{4}+i\frac{\pi}{2}$ 2) $6\log 2+i3\pi$

3) $12\log 2+9\pi i$ 4) $16\log 2+9\pi i$

77. $\log(i^i)=$

1) $\frac{-\pi}{2}$ 2) $\frac{\pi}{2}$ 3) $-\pi$ 4) π

78. If α,β are the complex cube roots of unity then $\alpha^{100}+\beta^{100}+\frac{1}{\alpha^{100}\times\beta^{100}}=$

1) -1 2) 1 3) w 4) 0

79. Let $1,w,w^2$ be the cube roots of unity, then the value of $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^5)=$

1) 5 2) 7 3) 9 4) 11

80. If $1,w,w^2$ are the cube roots of unity then the value of $(2-w)(2-w^2)(2-w^{10})(2-w^{11})=$

1) 7 2) 49 3) 64 4) 9

81. If $1,w,w^2$ are the cube roots of unity then the value of $(2+w)(2+w^2)(2+w^{10})(2+w^{11})=$

1) 7 2) 49 3) 64 4) 9

82. The value of $(3+w)(3+w^2)(3+w^{10})(3+w^{11})=$

1) 7 2) 49 3) 64 4) 9

83. If w represents a complex cube root of unity then $(3-w)(3-w^2)(3-w^4)(3-w^8)=$

1) 13 2) 81 3) 27 4) 169

84. If $|z^2|=2\,\mathrm{Re}(z)$ then the locus of z is

1) a circle $x^2+y^2+2x=0$

2) a circle $x^2+y^2-2x+2y=0$

3) a circle $x^2+y^2-2x=0$

4) a circle $x^2+y^2=0$

85. If $|z+3|=4$ then the locus of z

1) a circle with centre $(-3,0)$ and radius 2 units

2) a circle with centre $(-3,0)$ and radius 4 units

3) a circle with centre $(3,0)$ and radius 4 units

4) a circle with centre $(3,0)$ and radius 2 units

86. If $|z+2+3i|=5$ then the locus of the z is

1) a circle with centre $(2,3)$ and radius 25 units

2) a circle with centre $(-2,-3)$ and radius 25 units

3) a circle with centre $(2,3)$ and radius 5 units

4) a circle with centre $(-2,-3)$ and radius 5 units

87. If the imaginary part of $\frac{z-4}{z-2i}$ is '0' then the locus of 'z' is

1) ellipse 2) circle

3) straight line 4) parabola

88. If $\mathrm{amp}\, z=\frac{\pi}{4}$ then locus of z is

1) $y=0$ 2) $x=0$ 3) $y=x$ 4) $x+y=0$

89. If $\arg(z-2-3i)=\frac{\pi}{2}$ then the equation to the locus of z is

1) $x=0$ 2) $x=1$ 3) $x=2$ 4) $x=3$

90. The value of $(1+\sqrt{w}+w)(1-\sqrt{w}+w)=$

1) 0 2) 1 3) 27 4) 169

91. If α,β are the complex cube roots of unity then $\alpha^4+\beta^4+\alpha^{-1}\beta^{-1}=$

1) 1 2) ω 3) ω^2 4) 0

92. If n is a multiple of '3' then the value of $w^n+w^{2n}=$

1) 0 2) 1 3) ω^2 4) 0

93. If n is multiple of 3 then the value of $w^n+w^{2n}=$

1) 0 2) 1 3) 2 4) -1

94. $(a+b)^2+(aw+bw^2)^2(aw^2+bw)^2=$

1) $6ab$ 2) $3ab$ 3) $12ab$ 4) ab

95. $(1-w+w^2)^6+(1+w-w^2)^6=$

1) 2^7 2) 2^6 3) 2^8 4) 2^5

96. $\frac{a+bw+cw^2}{c+aw+bw^2}=$

1) 0 2) 1 3) ω 4) ω^2

97. $\frac{a+bw+cw^2}{c+aw+bw^2}+\frac{a+bw+cw^2}{b+cw+aw^2}=$

1) 1 2) 0 3) 2 4) -1

98. If $|z+ai|=|z-ai|$ then the equation of the locus of z is

1) $y=0$ 2) $x=0$

3) $x=y$ 4) $x^2+y^2=1$

99. If $\frac{z-1}{z+1}$ is purely imaginary then

1) $|z|=1$ 2) $|z|>1$ 3) $|z|<1$ 4) $|z|<2$

100. If $\frac{z-i}{z-1}$ is purely imaginary then the locus of z is

1) $x^2+y^2-x-y=0$

2) $x^2+y^2+x+y=0$

3) $x^2+y^2+2x-3y=0$

4) $x^2+y^2-x+3y=0$

101. If $\frac{z-4}{z-2i}$ is purely imaginary then the locus of z is

1) $(x-2)^2+(y-1)^2=5$

2) $x^2+y^2+x+y=0$

3) $x^2+y^2+2x-3y=0$

4) $x^2+y^2-x+3y=0$

102. $|z+3+2i|=|z+2+3i|$ then the locus of z is

1) a straight line 2) circle

3) parabola 4) hyperbola

103. If $\mathrm{Im}\, z^2=1$ then the locus of z is

1) parabola 2) hyperbola

3) rectangular hyperbola

4) ellipse

104. $\left[\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right]^{10}$ is a

1) a real number 2) a complex number

3) equal to 2 4) equal to 4

105. $\left[3(\cos 40^0+i\sin 40^0)\right]\left[4(\cos 80^0+i\sin 80^0)\right]=$

1) $-1+\sqrt{3}i$ 2) $2\left[-1+\sqrt{3}i\right]$

3) $4\left[-1+\sqrt{3}i\right]$ 4) $6\left[-1+\sqrt{3}i\right]$

106. $\frac{(\cos 2\theta+i\sin 2\theta)^3(\cos 3\theta-i\sin 3\theta)^5}{(\cos 3\theta+i\sin 3\theta)^2(\cos 4\theta+i\sin 4\theta)^3}=$

1) 0 2) $cis(-27\theta)$

3) $cis(27\theta)$ 4) $-cis(27\theta)$

107. The simplified value of $\dfrac{(\cos 3\theta+i\sin 3\theta)^4(\cos 2\theta-i\sin 2\theta)^5}{(\cos 4\theta+i\sin 4\theta)^7(\cos\theta-i\sin\theta)^6}=$

1) $\cos(20\theta)$ 2) $\cos(-20\theta)$
3) $cis(20\theta)$ 4) $cis(-20\theta)$

108. The cartesian form of $4\sqrt{3}\left[\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right]$ is

1) $2\sqrt{3}+6i$ 2) $-2\sqrt{3}+6i$
3) $-2\sqrt{3}-6i$ 4) $3\sqrt{2}+6i$

109. $(1+i\sqrt{3})^4$ can be writeen as

1) $8(1+i\sqrt{3})$ 2) $-8(1+i\sqrt{3})$
3) $4(1+i\sqrt{3})$ 4) $4(1+i\sqrt{3})$

111. If $x-\frac{1}{x}=2i\sin\theta$ then $x^n-\frac{1}{x^n}=$

1) $2\sin\theta$ 2) $2i\cos n\theta$
3) $2i\sin n\theta$ 4) $2\cos n\theta$

112. If $p=\cos 2\alpha+i\sin 2\alpha$, $q=\cos 2\beta+i\sin 2\beta$ then the value of $\sqrt{\frac{p}{q}}-\sqrt{\frac{q}{p}}=$

1) $2\cos(\alpha-\beta)$ 2) $2\sin(\alpha-\beta)$
3) $2i\sin(\alpha-\beta)$ 4) $2i\sin(\alpha+\beta)$

113. If A,B,C are the angles of the triangle ABC and if $x=cisA, y=cisB, z=cisC$ then $xyz=$

1) 1 2) -1 3) 0 4) 2

114. The value of $\left[\frac{-1+\sqrt{-3}}{2}\right]^9+\left[\frac{-1-\sqrt{-3}}{2}\right]^9=$

1) 0 2) 1 3) 2 4) -1

115. The value of $e^{2+3\pi i}$ is

1) e 2. $-e$ 3) e^2 4) $-e^2$

116. The value of e^{2+i} is

1) $e[\cos 1+i\sin 1]$ 2) $e^2[\cos 1+i\sin 1]$
3) $\cos 1+i\sin 1$ 4) $e^{-2}[\cos 1+i\sin 1]$

117. If $x_r=cis\left(\frac{\pi}{3^r}\right)$ $r=1,2,---\infty$ then $x_1,x_2---\infty=$

1) 1 2) -1 3) i 4) $-i$

118. If $z=2-3i$ then $z^2-4z+13=$

1) 0 2) 1 3) 2 4) 3

119. $z+\frac{1}{z}=1$ then the value of $z^{14}+\frac{1}{z^{14}}=$

1) 1 2) -1 3) 0 4) 2

PRACTICE SET - I KEY

1) 4	2) 4	3) 1	4) 4	5) 2
6) 2	7) 1	8) 2	9) 3	10) 4
11) 3	12) 2	13) 1	14) 2	15) 1
16) 1	17) 2	18) 4	19) 4	20) 2
21. 3	22) 3	23) 2	24) 4	25) 1
26) 1	27) 3	28) 2	29) 3	30) 1
31) 2	32) 3	33) 2	34) 2	35) 1
36) 1	37) 4	38) 1	39) 2	40) 1
41) 3	42) 1	43) 2	44) 3	45) 1
46) 3	47) 1	48) 3	49) 2	50) 3
51) 3	52) 3	53) 2	54) 2	55) 4
56) 2	57) 1	58) 3	59) 4	60) 2
61) 4	62) 4	63) 1	64) 2	65) 1
66) 3	67) 1	68) 3	69) 2	70) 3
71) 1	72) 2	73) 3	74) 3	75) 4
76) 2	77) 1	78) 4	79) 3	80) 2
81) 4	82) 2	83) 4	84) 1	85) 4
86) 4	87) 3	88) 1	89) 1	90) 4
91) 4	92) 1	93) 1	94) 1	95) 1
96) 1	97) 3	98) 3	99) 2	100) 4
101) 3	102) 3	103) 3	104) 2	105) 4
106) 2	107) 4	108) 2	109) 2	110) 3
111) 3	112) 4	113) 2	114) 3	115) 4
116) 2	117) 3	118) 1	119) 2	

PRACTICE SET - II

01. The complex number $\frac{1+2i}{1-i}$ lies in the Quadrant number

1) I 2) II 3) III 4) IV

02. $\frac{1}{i-1}+\frac{1}{i+1}$ is

1) Positive rational number
2) purely imaginary
3) Positive Integer
4) Negative integer

03. $\left|\frac{1}{(1-i)^2}-\frac{1}{(1+i)^2}\right|=$

1) 4 2) 3 3) 2 4) 1

04. The smallest positive integer n such that $\left(\frac{1-i}{1+i}\right)^n=1$ is

1) 4 2) 2 3) 3 4) 1

05. The smallest positive integer n for which $\frac{(1+i)^n}{(1-i)^{n-2}}$ is real is

1) 1 2) 2 3) 3 4) 4

06. If $\frac{2+3i}{(7-i)(4+2i)}=a+ib$ then a=

1) $\frac{9}{100}$ 2) $\frac{7}{100}$ 3) $\frac{-9}{100}$ 4) $\frac{-7}{100}$

07. $\frac{(2+i)^2}{3-4i}=$

1) 0 2) -1 3) i 4) 1

08. If $(x+iy)(2-3i)=4+i$ then $(x,y)=$

1) $\left(1,\frac{1}{13}\right)$ 2) $\left(-\frac{5}{13},\frac{14}{13}\right)$
3) $\left(\frac{5}{13},\frac{14}{13}\right)$ 4) $\left(-\frac{5}{13},-\frac{14}{13}\right)$

09. When a is real number then $(z+a)(\bar{z}+a)=$

1) $|z-a|$ 2) z^2+a^2
3) $|z+a|^2$ 4) z^2-a^2

10. $\frac{3+2i}{2-5i}+\frac{3-2i}{2+5i}$ is

1) purely real 2) purely imaginary
3) equal to zero 4) $2+5i$

11. If $\frac{5z_1}{7z_2}$ is purely imaginary then $\left|\frac{2z_1+3z_2}{2z_1-3z_2}\right|=$

1) $\frac{5}{7}$ 2) $\frac{7}{5}$ 3) 1 4) $\frac{3}{5}$

12. In the argand diagram, the complex number z is in Q IV then $\bar{z},-z,-\bar{z}$ are respectively are in quadrants

1) 1,3,2 2) 1,2,3 3) 3,2,1 4) 2,1,3

13. If $2+i\sqrt{3}$ is one root of $x^2+px+q=0$ then $p,q=$

1) 4,7 2) 1,1 3) -4,7 4) 4,4

14. $z_1=4-3i, z_2=-1+2i$ then $(z_1+z_2)(\bar{z_1}+\bar{z_2})=$

1) 8 2) 10 3) 12 4) 3

15. The triangle formed by the complex numbers $1,\frac{-1+i\sqrt{3}}{2},\frac{-1-i\sqrt{3}}{2}$ is

1) equilateral 2) right angled
3) isosceles
4) right angled isosceles

16. The area of triangle formed by the complex numbers $2+3i, 1+i, i-1$ in sq.units is

1) $\frac{1}{2}$ 2) 1 3) $\sqrt{2}$ 4) 2

17. If $(x+iy)^{1/3}=a+ib$ then $\frac{x}{a}+\frac{y}{b}=$

1) a^2-b^2 2) $2(a^2-b^2)$
3) $3(a^2-b^2)$ 4) $4(a^2-b^2)$

18. If the square of $(a+ib)$ is real then $ab=$

1) 0 2) 1 3) -1 4) 2

19. The value of $\left(\frac{-1+i\sqrt{3}}{2}\right)^{12}+\left(\frac{-1-i\sqrt{3}}{2}\right)^{12}=$

1) 1 2) -1 3) 2 4) -2

20. If α,β are the roots of $x^2+x+1=0$ then $\alpha^{28}+\beta^{28}=$

1) 1 2) -1 3) 0 4) 2

21. $1, w, w^2$ are cube roots of unity then the value of $(a+b+c)(a+bw+cw^2)(a+bw^2+cw)=$

1) $a^3+b^3+c^3$

2) $a^3+b^3+c^3+3abc$

3) $a^3+b^3+c^3-3abc$

4) $a^3+b^3+c^3-abc$

22. If $1, w, w^2$ are cube roots of unity then the value of $(a+2b)^2+(aw+2bw^2)^2+(aw^2+2bw)^2=$

1) 4ab 2) 8ab 3) 12 ab 4) 16ab

23. $(2+5\omega+2\omega^2)^6-(2+2\omega+5\omega^2)^6=$

1) 3^6 2) 3^7 3) 0 4) 243

24. The centre of the circle passing through the points $1,\frac{-1+i\sqrt{3}}{2},\frac{-1-i\sqrt{3}}{2}$ is

1) $(1,1)$ 2) $\left(\frac{\sqrt{3}}{2},\frac{\sqrt{3}}{2}\right)$

3) $\left(-\frac{\sqrt{3}}{2},\frac{\sqrt{3}}{2}\right)$ 4) $(0,0)$

25. If $1, w, w^2$ are cube roots of unity then the roots of $(x-1)^3+8=0$ are

1) $-1, 1+2w, 1+2w^2$ 2) $-1, 1-2w, 1-2w^2$

3) $-1,-1,-1$ 4) 2,2,2

PRACTICE SET - II KEY

1) 2	2) 2	3) 4	4) 1	5) 1
6) 1	7) 4	8) 3	9) 3	10) 1
11) 3	12) 2	13) 3	14) 2	15) 1
16) 4	17) 4	18) 1	19) 3	20) 2
21) 3	22) 3	23) 3	24) 4	25) 2

SELF TEST

01. $\left(\frac{1+i}{1-i}\right)^3-\left(\frac{1-i}{1+i}\right)^3=$

1) i 2) -i 3) 2i 4) -2i

02. $1+i^2+i^4+i^6+i^8+.....i^{2n}=$

1) +ve 2) -ve

3) 0 4) cannot be determined

03. Conjugate of $\frac{2-i}{(1-2i)^2}$ is

1) $\frac{2+11i}{25}$ 2) $\frac{-2+11i}{25}$

3) $\frac{-2-11i}{25}$ 4) $\frac{2-11i}{25}$

04. If $z=1-3i$ then $z^2-2z+10=$

1) 1 2) 0 3) -1 4) 2

05. If $|z_1|=|z_2|=1$ then $|z_1+z_2|=$

1) $\left|\frac{1}{z_1}+\frac{1}{z_2}\right|$ 2) $\left|\frac{1}{z_1}-\frac{1}{z_2}\right|$

3) $\left|\frac{1}{z_1}\cdot\frac{1}{z_2}\right|$ 4) 2

06. If $A+iB=2i^4+6i^3$ then $A+B$

1) -8 2) -6 3) -4 4) -2

07. The multiplicative inverse of $7+24i$

1) $7-24i$ 2) $\frac{7-24i}{625}$

3) $\frac{24-7i}{625}$ 4) $\frac{24+7i}{625}$

08. $\sqrt{7+24i}$

1) $\pm(4+3i)$ 2) $\pm(4-3i)$

3) $\pm(3+4i)$ 4) $\pm(3-4i)$

09. $(1-i)^3(1+i)=$

1) $-4i$ 2) $4i$ 3) i 4) -i

10. If $\frac{2+3i}{(7-i)(4+2i)}=A+iB$ then A^2+B^2

1) $\frac{13}{100}$ 2) $\frac{13}{1000}$ 3) $\frac{19}{100}$ 4) $\frac{19}{1000}$

11. If $\arg\ \bar{z}_1=\frac{\pi}{5}$, $\operatorname{Arg} z_2=\frac{\pi}{3}$ then $\operatorname{Arg} z_1+\operatorname{Arg} z_2$

1) $-\frac{\pi}{15}$ 2) $\frac{\pi}{15}$ 3) $-\frac{\pi}{15}$ 4) $\frac{2\pi}{15}$

12. If $|z_1+z_2|=|z_1-z_2|$ then $\operatorname{Arg} z_1-\operatorname{Arg} z_2$

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

13. If $x=\cos\theta+i\sin\theta$ then $x^3+\frac{1}{x^3}=$

1) $\cos 3\theta$ 2) $2\cos\theta$

3) $2\cos 3\theta$ 4) $3\cos 2\theta$

14. The modulus of the complex number $\frac{(a+ib)(p-iq)}{(a-ib)(p+iq)}$

1) 1

2) $(a^2+b^2)(p^2+q^2)$

3) $\frac{a^2+b^2}{p^2+q^2}$ 4) $\frac{p^2+q^2}{a^2+b^2}$

15. If $z=r\,e^{i\theta}$ then $|e^{iz}|$ is equal to

1) $e^{-r\sin\theta}$ 2) $e^{-r\cos\theta}$

3) $re^{-r\sin\theta}$ 4) $re^{-r\cos\theta}$

16. The amplitude of $\frac{a+ib}{a-ib}$ is equal to

1) $\tan^{-1}\frac{2ab}{a^2+b^2}$ 2) $\tan^{-1}\frac{2ab}{a^2-b^2}$

3) $\tan^{-1}\frac{a^2-b^2}{a^2+b^2}$ 4) none

17. The value of $\left(\frac{1+\sqrt{3}}{1-\sqrt{3}}\right)^6+\left(\frac{1-i\sqrt{3}}{1+i\sqrt{3}}\right)^6$ is

1) 2 2) -2 3) 1 4) 0

18. If $i=\sqrt{-1}$ and n is a +ve integer then $i^n+i^{n+1}+i^{n+2}+i^{n+3}=$

1) 1 2) i 3) i^n 4) 0

19. If $x=\cos\theta+i\sin\theta$, $y=\cos\varphi+i\sin\varphi$ then $\frac{x-y}{x+y}$ is equal to

1) $\tan\frac{\theta-\varphi}{2}$ 2) $i\tan\frac{\theta-\varphi}{2}$

3) $-i\tan\frac{\theta-\varphi}{2}$ 4) $i\cot\frac{\theta-\varphi}{2}$

SELF TEST KEY

01) 4	02) 4	03) 4	04) 2	05) 1
06) 3	07) 2	08) 1	09) 1	10) 2
11) 4	12) 4	13) 3	14) 1	15) 1
16) 2	17) 2	18) 4	19) 2	

PREVIOUS EAMCET QUESTIONS

01. If ω is one of the complex cube roots of unity then $(1-\omega+\omega^2)(1+\omega-\omega^2)$ is equal to

1) 0 2) 4 3) 3ω 4) 1

02. The straight line joining the point $7+7i$ and origin in the Argand diagram has the equation.

1) $y=x$ 2) $y=7$ 3) $x=7$ 4) $y=0$

03. The perpendicular bisector of the line segment joining the points $7+7i$ and $7-7i$ in the Argand diagram has the equation (1979)

1) $y=0$ 2) $x=0$
3) $y=x$ 4) $x+y=0$

04. If $i^2=-1$ and $\theta=\frac{\pi}{6}$ then the 10 the term of the series

$1+(\cos\theta+i\sin\theta)^2+(\cos\theta+i\sin\theta)^3+$...(1981)

1) -1 2) -i 3) $\frac{1}{2}+\frac{\sqrt{3}i}{2}$ 4) none

05. If $(\sqrt{3}+i)^{100}=2^{99}(a+ib)$ then b= (1982)

06. If $x-\frac{1}{x}=2\sin\theta$ then $x^2-\frac{1}{x^2}=$— (1983)

07. If x satisfies the equation $x^2-2x\cos\theta+1=0$ then the value $x^n+\frac{1}{x^n}=$--- (1984)

1) $2^n\cos n\theta$ 2) $2^n\cos^n\theta$
3) $2\cos n\theta$ 4) $2\cos^n\theta$

08. If $x=a+b$, $y=a\omega^2+b\omega$ and $z=a\omega+b\omega^2$ where ω is a complex cube root of unity then the product of xyz is equal to ....(1984)

09. If α and β are real then $\left|\frac{\alpha+i\beta}{\beta+i\alpha}\right|$ (1985)

1) lies between 0 and 1 2) = 1
3) >1 4) none

10. $\log(\log i)=$ (1985)

1) $\log\left(\frac{\pi}{2}+\frac{i\pi}{2}\right)$ 2) $\log\left(\frac{\pi}{2}-\frac{i\pi}{2}\right)$
3) $\log\frac{\pi}{2}+\frac{i\pi}{2}$ 4) $\log\frac{\pi}{2}-\frac{i\pi}{2}$

11. If $1,\omega,\omega^2$ are the cube roots of unity then

$(x+y+z)(x+y\omega+z\omega^2)(x+y\omega^2+z\omega)=$_ (1985)

12. If $|z_1+z_2|=|z_1-z_2|$ then the difference of the amplitude of z_1 and z_2 is .... (1986)

13. If x = cosA + isinA and y = cosB + isinB then the value of cos (A+B) in terms x and y is — (1986)

PREVIOUS EAMCET KEY

1) 2	2) 1	3) 1	4) 3	5) 3
6) $2i\sin 2\theta$	7) 3	8) a^3+b^3		
9) 2	10) 3	11) $x^3+y^3+z^3-3xyz$		
12) 2	13) 3			

ALL POWER IS WITHIN YOU
YOU CAN DO ANY THING
AND EVERY THING

TRIGONOMETRY
PREVIOUS ECET QUESTIONS

2008

01. $\sin 2i\cos 9^0-\cos 84^0\cos 6^0=$

1) $\frac{1}{4}$ 2) $\frac{1}{8}$ 3) $\frac{3}{2}$ 4) $\frac{3}{8}$

02. The general solution of $\tan^2\theta=3$ is

1) $n\pi+(-1)^n\frac{\pi}{3}$ 2) $2n\pi\pm\frac{\pi}{3}$
3) $n\pi\pm\frac{\pi}{3}$ 4) $2n\pi+(-1)^n\frac{\pi}{3}$

03. In ΔABC, if a = 3, b = 4, $\sin A=\frac{3}{4}$ then $\underline{|B}=$

1) π 2) 2π 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{3}$

04. $\cos\left[\sin^{-1}\left[-\frac{4}{5}\right]-\cos^{-1}\left[\frac{4}{5}\right]\right]=$

1) $\frac{\pi}{2}$ 2) $\frac{-\pi}{2}$ 3) 0 4) π

05. The polar form of the complex number $1+i$ is

1) $\cos\frac{\pi}{4}+i\sin\frac{\pi}{2}$ 2) $\cos\frac{\pi}{4}-i\sin\frac{\pi}{2}$
3) $\sqrt{2}\left[\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right]$
4) $\sqrt{2}\left[\cos\frac{\pi}{4}-i\sin\frac{\pi}{4}\right]$

06. If $\frac{\sqrt{3}+i}{\sqrt{3}-i}=a+ib$ then

1) $a=\frac{1}{4}, b=\frac{1}{2}$ 2) $a=\frac{1}{2}, b=\frac{1}{4}$
3) $a=\frac{1}{4}, b=\frac{\sqrt{3}}{2}$
4) $a=\frac{1}{2}, b=\frac{\sqrt{3}}{2}$

07. If $(\sqrt{3}+i)^{100}=2^{99}(a+ib)$, then $a^2+b^2=$

1) $\sqrt{2}$ 2) 4 3) $\sqrt{3}$ 4) 3

2009

08. If 'n' is positive integer which is a multiple of 3, then $1+\omega^2+\omega^{2n}=$

1) 2 2) 3 3) 1 4) 0

09. If 'θ' is an acute angle and $\tan\theta=\frac{1}{\sqrt{7}}$ then $\frac{\csc^2\theta-\sec^2\theta}{\csc^2\theta+\sec^2\theta}$

1) $\frac{3}{4}$ 2) $\frac{1}{2}$ 3) 2 4) $\frac{3}{4}$

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

1) $\sin\theta$ 2) $\cos\theta$ 3) $\tan\theta$ 4) $\cot\theta$

11. In ΔABC $\Sigma\cos\frac{A}{2}\cos\left(\frac{B-C}{2}\right)=$

1) $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
2) $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
3) $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
4) $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

12. If a = 5, b = 12, c = 13 then $\tan\left(\frac{A}{2}\right)=$

1) $\frac{1}{5}$ 2) $\frac{2}{5}$ 3) $\frac{3}{5}$ 4) $\frac{4}{5}$

13. $\tan\left(\frac{\pi}{4}+\theta\right)\tan\left(\frac{3\pi}{4}+\theta\right)=$

1) 0 2) -1 3) 1 4) 2

14. The value of log i =

1) $-i\frac{\pi}{2}$ 2) $i\frac{\pi}{2}$ 3) $\frac{\pi}{2}$ 4) $i\pi$

15. If $f(x)=x^2$ in $(-\pi,\pi)$ then $b_n=$
1) 1 2) 0 3) 3 4) 2

16. If $\tan A=\frac{1}{2};\tan B=\frac{1}{3}$ then $\cos 2A-\sin 2B=$
1) 0 2) 1 3) 2 4) 3

2010

17. If $\tan\theta=\frac{a}{b}$ then the value of $\frac{a\sin\theta+b\cos\theta}{a\sin\theta-b\cos\theta}$
1) $\frac{a^2-b^2}{a^2+b^2}$ 2) $\frac{-a^2+b^2}{a^2-b^2}$
3) $\frac{a^2+b^2}{a^2-b^2}$ 4) $\frac{-a^2-b^2}{a^2+b^2}$

18. The value of
$\cot A+\tan(180+A)+\tan(90^0+A)+\tan(30^0-A)$
is
1) 0 2) 1 3) -1 4) $\sqrt{3}$

19. If $\tan\theta=\frac{1}{2}$ then the value of $\cos 2\theta$ is
1) $3/5$ 2) $5/3$ 3) $-3/5$ 4) $-5/3$

20. If $x=a\cos^2\theta\sin\theta$ and $y=a\sin^2\theta\cos\theta$,
then $\frac{(x^2+y^2)^3}{x^2y^2}$ is
1) a^2 2) a^3 3) a^4 4) a^5

21. The principle value of the argument of $-\sqrt{3}+i$ is
1) $2\pi/3$ 2) $-2\pi/3$ 3) $\pi/3$ 4) $5\pi/3$

22. $(\omega^2+\omega-1)^3(\omega^2-\omega+1)^3=$
1) 44 2) 54 3) 64 4) 74

23. The conjugate complex number of $\frac{-5i}{7+i}$ is
1) $\frac{1+7i}{10}$ 2) $\frac{1-7i}{10}$ 3) $\frac{-1+7i}{10}$ 4) $\frac{-1-7i}{10}$

2011

24. If the angles A,B,C of a $\Delta A,B,C$ are in arithmetic progression then ('a' is side opposite angle A, 'b' is side opposite angle B, 'c' is side opposite angle C)
1) $c^2=a^2+b^2-ab$ 2) $b^2=a^2+c^2-ac$
3) $c^2=a^2+b^2$ 4) $a^2+b^2+c^2=0$

25. If $\sin^{-1}x=\frac{\pi}{5}$ for some $x\in(-1,1)$, then the value of $\cos^{-1}x$ is
1) $3\pi/10$ 2) $5\pi/10$ 3) $7\pi/10$ 4) $9\pi/10$

26. The equation $Cosx+Sinx=2$ has
1) only one equation 2) two solutions
3) no solution 4) infinitely many solutions

27. If $\sin\theta+\cos\theta=1$, then the value of $\sin 2\theta$ is
1) 1 2) $1/2$ 3) 0 4) -1

28. The minimum value of $3\sin\theta+4\cos\theta$ is
1) 5 2) 1 3) 3 4) -5

29. If $\tan\theta=\frac{1}{2}$ and $\tan\varphi$ is
1) $\frac{\pi}{6}$ 2) π 3) 0 4) $\frac{\pi}{4}$

30. $(z+a)(\bar{z}+a)$ where a is real is equivalent to
1) $|z-a|$ 2) z^2+a^2 3) $|z+a|^2$ 4) z^2-a^2

31. A square root of $3+4i$ is
1) $\sqrt{3}+1$ 2) $2+i$ 3) $-2+i$ 4) $1-3i$

32. If Z_1 and Z_2 are two complex numbers then $|z_1+z_2|$ is
1) $<|z_1|+|z_2|$ 2) $\leq|z_1|-|z_2|$
3) $\leq|z_1|+|z_2|$ 4) $<|z_1|-|z_2|$

2012

33. The period of the function $f(x)=|\sin x|$ is
1) π 2) 2π 3) 3π 4) 4π

34. If $A+B=45°$, then $(1-\cot A).(1-\cot B)$ is
1) 1 2) 0 3) 2 4) -1

35. The value of $\sin 78°+\cos 132°$ is
1) $\frac{\sqrt{5}+1}{4}$ 2) $\frac{\sqrt{5}+1}{2}$ 3) $\frac{\sqrt{5}-1}{2}$ 4) $\frac{\sqrt{5}-1}{4}$

36. If $A+B+C=\pi$, then $\sin 2A+\sin 2B+\sin 2C=$
1) $4\cos A\sin B\cos C$ 2) $4\sin A\cos B\sin C$
3) $4\cos A\cos B\cos C$ 4) $4\sin A\sin B\sin C$

37. The principal solution of $\tan x=0$ is
1) $x=n\pi, n\in Z$ 2) $x=0$
3) $x=(2n+1)\pi/2, n\in Z$
4) $x=n\pi+\alpha, n\in Z$

38. The value of $\tan^{-1}(2)+\tan^{-1}(3)$ is
1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{3}$ 4) $\frac{3\pi}{4}$

39. If the sides of a right angle triangle are in A.P., then the ratio of its sides is
1) 1:2:3 2) 2:3:4 3) 3:4:5 4) 4:5:6

40. The value of $r.r_1.r_2.r_3$ is
1) Δ^2 2) Δ^{-2} 3) Δ^{-3} 4) Δ^4

41. $\frac{1}{r1}+\frac{1}{r2}+\frac{1}{r3}=$
1) $\frac{1}{r}$ 2) $\frac{1}{2r}$ 3) $\frac{1}{R}$ 4) $\frac{1}{\Delta}$

42. If $a=6,b=5,c=9$, then the value of triangle A is
1) $\cos^{-1}(2/9)$ 2) $\cos^{-1}(2/5)$
3) $\cos^{-1}(7/9)$ 4) $\cos^{-1}(1/3)$

43. The polar form of complex number $1-i$ is
1) $\sqrt{2}\,e^{-i\pi/4}$ 2) $\sqrt{2}\,e^{i\pi/4}$
3) $\sqrt{2}\,e^{i\pi/2}$ 4) $\sqrt{2}\,e^{-i\pi/2}$

2013

44. In a triangle ABC if a/cosA = b/cosB = c/cos C, then the triangle is
1) Isosceles 2) Equilateral
3) Right angled 4) right angled isosceles

45. If the sides of triangle are 13, 14, 15 then the radius of the incircle is
1) 14 2) 8 3) 4 4) 2

46. The modulus of (7 - 24i) / (3 + 4i) is
1) 15 2) 20 3) 10 4) 5

47. $(\sqrt{3}/2+i/2)^6+(\sqrt{3}/2-i/2)^6=$
1) -2 2) 2 3) 1 4) -1

48. The value of $\cot(\pi/20)\cot(3\pi/20)\cot(5\pi/20)\cot(7\pi/20)\cot(9\pi/20)=$
1) 2 2) -2 3) 1 4) 0

49. If A + B = 45°, then (1 + tan A) (1 + tan B) =
1) 0 2) 1 3) 3 4) 2

50. $(1+\cos 2\theta)/(\sin 2\theta)=$
1) $\tan 2\theta$ 2) $\cot\theta$ 3) 3 4) 2

51. If $\tan(A/2)=t$, then $\sin A+\tan A=$
1) $4y/(1-t^4)$ 2) $2t/(1+t^4)$
3) $(1+t)(1-t)$ 4) $(1-t)/(1+t)$

52. The minimum value of $3\sin x+4\cos x+5$ is
1) 5 2) 10 3) -5 4) 0

53. If $\cos x+\cos y=1/4$, then $\tan(x+y)/2=$
1) 7/12 2) 1/12 3) 3/4 4) 4/3

54. If $3\tan\theta=\cot\theta$, then $\theta=$
1) $n\pi$ 2) $2n\pi+\pi/6$ 3) 0
4) $n\pi+\pi/6$ or $n\pi-\pi/6$

55. $\sin[\sin^{-1}(1/2)+\cos^{-1}(1/2)]=$
1) 1 2) $1/2$ 3) $1/3$ 4) 3/4

2014

56. If $A+B=45°$, then $(1+\tan A)(1+\tan B)=$
1) 0 2) 1 3) $\frac{1}{2}$ 4) 2

57. $\left(\frac{\sin 2A}{1-\cos 2A}\right)\left(\frac{1-\cos A}{\cos A}\right)=$
1) $\tan\frac{A}{2}$ 2) $\cos\frac{A}{2}$ 3) $\sec\frac{A}{2}$ 4) $\operatorname{cosec}\frac{A}{2}$

58. The value of $\frac{\sin 70°-\cos 40°}{\cos 50°-\sin 20°}=$
1) 1 2) $\frac{1}{\sqrt{2}}$ 3) $\frac{1}{\sqrt{3}}$ 4) 0

59. $4\sin\frac{11\theta}{2}\cos\frac{11}{2}\theta\ \cos 5\theta$ expressed as sum or difference is

1) $\sin 15\theta - \sin 6\theta$ 2) $\sin 16\theta + \sin 6\theta$
3) $\sin 11\theta + \sin 8\theta$ 4) $\sin 11\theta - \sin 8\theta$

60. If $2\cos^2\theta + 11\sin\theta = 7$, the principal value of θ is

1) 60° 2) 45° 3) 30° 4) $22\frac{1}{2}^\circ$

61. Which one of the following equation is FALSE

1) $\cos^{-1}(-x) = \pi - \cos^{-1}x$
2) $\sin^{-1}(-x) = \pi - \sin^{-1}x$
3) if $-1 \le x \le 1$, then $\cos^{-1}x + \sin^{-1}x = \frac{\pi}{2}$
4) $\sin^{-1}x \ne \frac{1}{\sin x}$

62. If any triangle ABC, $\Sigma(b+c)\cos A =$

1) $a+b+c$ 2) $2(a+b+c)$
3) $3(a+b+c)$ 4) 0

63. With the usual notation, in a triangle ABC $s\left[\frac{r_1-r}{a}+\frac{r_2-r}{b}+\frac{r_3-r}{c}\right]=$

1) $2(r_1+r_2+r_3)$ 2) $3(r_1+r_2+r_3)$
3) $r_1+r_2+r_3$ 4) 0

64. The modulus amplitude form of $-\sqrt{3}+i$ is

1) $2cis\frac{5\pi}{6}$ 2) $2cis\frac{3\pi}{6}$
3) $2cis\frac{\pi}{3}$ 4) $2cis\frac{\pi}{6}$

65. If $x = \cos\theta + i\sin\theta$, then the value of $x^6 + \left(\frac{1}{x^6}\right)$

1) 0 2) $2i\sin 6\theta$
3) $2\cos 6\theta$ 4) $2(\cos 6\theta + \sin 6\theta)$

A.P. ECET-2015

66. The general solution of the equation $\tan\theta + \tan 4\theta + \tan 7\theta = \tan\theta\tan 4\theta\tan 7\theta$ is

1) $\theta = \frac{n\pi}{4}$ 2) $\theta = \frac{n\pi}{12}$
3) $\theta = \frac{n\pi}{6}$ 4) $\theta = \frac{n\pi}{2}$

67. If $\theta = \frac{1}{2}\left(a+\frac{1}{a}\right)$, then $\cos 3\theta = K\left(a^3+\frac{1}{a^3}\right)$ cos
where K is equal to

1) $\frac{1}{2}$ 2) $-\frac{1}{2}$ 3) 1 4) $\frac{3}{2}$

68. $\tan 20^0 + \tan 40^0 + \tan 60^0 + ... + \tan 180^0 =$

1) 0 2) 1 3) 2 4) 3

69. $\frac{3\cos\theta + \cos 3\theta}{3\sin\theta - \sin 3\theta} =$

1) $\cot^2\theta$ 2) $\cot^4\theta$
3) $\cot^3\theta$ 4) $2\cot\theta$

70. If $\sin\theta + \sin 3\theta + \sin 5\theta = 0, 0 \le \theta \le \frac{\pi}{2}$ then $\theta =$

1) $0, \frac{\pi}{3}$ 2) $0, \frac{\pi}{2}$ 3) $1, \frac{\pi}{2}$ 4) $2, \frac{\pi}{3}$

71. $\cos^{-1}\left(\cos\left(\frac{5\pi}{4}\right)\right) =$

1) $\frac{5\pi}{4}$ 2) $\frac{3\pi}{4}$ 3) $-\frac{\pi}{4}$ 4) $\frac{-5\pi}{4}$

73. If $u = \log\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)$ then $\cosh u =$

1) $\sin\theta$ 2) $\cos\theta$
3) $\csc\theta$ 4) $\mathrm{cosec}\ \theta$

74. In ΔABC, if $a\cos A + b\cos B + c\cos C = \frac{2\Delta}{k}$ then $k =$

1) r 2) R 3) s 4) R^2

75. In ΔABC, if b cos A = a B then the triangle is

1) right angled 2) isosceles
3) equilateral 4) scalene

76. If in $\Delta ABC, \tan\frac{A}{2} = \frac{5}{6}$ and $\tan\frac{C}{2} = \frac{2}{5}$ then a, b, c are in such that

1) $b^2 = ac$ 2) $2b = a+c$
3) $2ac = b(a+c)$ 4) $a+b=c$

77. Imaginary part of $\frac{4+3i}{(2+3i)(4-3i)} =$

1) $\frac{86}{325}$ 2) $-\frac{86}{325}$ 3) $\frac{27}{325}$ 4) $\frac{29}{325}$

78. The value of $i^2+i^4+i^6+..(2n+1)\ terms =$

1) 1 2) -1 3) 0 4) i

T.S ECET- 2015

79. If A+B+C= 90^0, then tan A tan B+tanB tanC+ tan C tan A is equal to:

1) 0 2) 1 3) 2 4) 3

80. If $x+\frac{1}{x} = 2\cos\theta$ then $x^2+\frac{1}{x^2}$ is

1) $4\cos^2\theta$ 2) $4\cos 2\theta$
3) $2\cos^2\theta$ 4) $2\cos 2\theta$

81. If A+B+C = 180^0, then sin 2A+sin 2B+sinB+sin2C is equal to:

1) sin2A sin2B sin 2C 2) sinA sinB sinC
3) 4 sin 2A sin 2B sin2C 4) 4sinA sinB sinC

82. $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \pi$, then x+y+z is equal to:

1) 0 2) 1 3) xyz 4) x-y-z

83. The general solution of $\tan^2\theta = 3 is$:

1) $n\pi$ 2) $n\pi \pm (\pi/3)$
3) $(n\pi/3)$ 4) π

84. In any triangle ABC, if R is a circum radius, then the value of $\frac{\sin A}{a}+\frac{\sin B}{b}+\frac{\sin C}{c}$ is

1) $\frac{1}{R}$ 2) $\frac{1}{2R}$ 3) $\frac{3}{R}$ 4) $\frac{3}{2R}$

85. If a, b, c are the sides of the triangle, then the angle A can be obtained by cosA =

1) $\frac{a^2+b^2+c^2}{2bc}$ 2) $\frac{a^2-b^2+c^2}{2bc}$
3) $\frac{a^2+b^2-c^2}{2bc}$ 4) $\frac{-a^2+b^2+c^2}{2bc}$

86. $(\cosh x + \sinh x)^n$ is equal to

1) cos nhx + sin hx 2) $\cos^n hx + \sin^n hx$
3) $\cosh^n + \sinh^n x$ 4) $\cosh nx + \sinh nx$

87 $(\cos\theta + \sin\theta)^n$ is equal to

1) $\cos^n\theta + i\sin^n\theta$ 2) $\cos\theta^n + i\sin\theta^n$
3) $\cos\theta + i\sin\theta$ 4) $\cos n\theta + i\sin n\theta$

88. If $z = (\cos\theta + i\sin\theta)$, then $z^3 + \frac{1}{z^3}$ is equal to

1) $\cos^3\theta$ 2) $\cos 3\theta$
3) $2\cos^3\theta$ 4) $2\cos 3\theta$

1) $\frac{1}{R}$ 2) $\frac{1}{2R}$ 3) $\frac{3}{R}$ 4) $\frac{3}{2R}$

A.P ECET- 2016

89. The value of $\cos 105^0 =$

1) $\frac{1-\sqrt{3}}{2\sqrt{2}}$ 2) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
3) $\frac{\sqrt{3}+1}{2}$ 4) $2+\sqrt{3}$

90. If $a\sin^2\theta + b\cos^2\theta = c$ then $\tan^2\theta =$

1) $\frac{b-c}{a-c}$ 2) $\frac{a-c}{b-c}$ 3) $\frac{c-b}{a-c}$ 4) $\frac{a-c}{c-b}$

91. The value of $6\sin 20^\circ - 8\sin^3 20^\circ =$

1) 2 2) $\frac{1}{\sqrt{2}}$ 3) $\sqrt{3}$ 4) $\frac{1}{\sqrt{3}}$

92. If $\sin\theta + \operatorname{cosec}\theta = 2$ then the value of $\sin^6\theta + \operatorname{cosec}^6\theta =$

1) 0 2) 50 3) 1 4) 2

93. The sine function with period 3 is

1) $\sin\frac{2\pi x}{3}$ 2) $\sin\frac{\pi x}{3}$

3) $\sin 3\pi x$ 4) $\sin\frac{3\pi x}{2}$

94. The maximum value of $3\sin^2 x + 5\cos^2 x$ is

1) 8 2) 3 3) 5 4) 34

95. The smallest value of θ satifying $\sqrt{3}(\tan\theta + \cot\theta) = 4$ is

1) $\frac{2\pi}{3}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) $\frac{\pi}{12}$

96. The value of $\cos\left[\sin^{-1}\left(\frac{3}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right)\right] =$

1) $\frac{33}{25}$ 2) $\frac{33}{65}$ 3) $\frac{25}{33}$ 4) $\frac{56}{65}$

97. The value of $\sin\theta + \sin(\theta + 120^0) - \sin(120^0 - \theta) =$

1) 0 2) $\sin\theta$ 3) 1 4) $-\sin\theta$

98. The principal solution of 3cosec A=4sinA is

1) $\frac{\pi}{4}$ 2) $\pm\frac{\pi}{3}$ 3) $\pm\frac{\pi}{6}$ 4) $\pm 2\pi$

99. The complex number z satisfying the equatin $z^2 + \bar{z}^2 = 2$ forms

1) a straight line 2) a circle

3) a parabola 4) a hyperbola

100. The value of $(1-i)^8$ is

1) 4 2) 8 3) 16 4) 256

T.S ECET- 2016

101. If $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is real, then the value of $\theta =$

1) $\frac{\pi}{6}$ 2) 0 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{8}$

102. $(1+i\sqrt{3})^9 =$

1) -2^9 2) 2^9 3) -1 4) 2

103. If $\left|\frac{z-i}{z+i}\right| = 1$, then the locus of z is

1) x=1 2) y=1 3) x-axis 4) y-axis

104. If $\sin\theta + \sin^2\theta = 1$, then $\cos^8\theta + 2\cos^6\theta + \cos^4\theta$

1) 1 2) -1 3) 2 4) 0

105. $\sin\left[\cot^{-1}\left(\frac{2x}{1-x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right] =$

1) 0 2) -1 3) $\frac{1}{2}$ 4) 1

106. If $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$, then $\cos^{-1}x + \cos^{-1}y =$

1) π 2) $\pi + \frac{x}{2}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{4}$

107. Solution of $7\sin^2 x + 3\cos^2 x - 4 = 0$ is

1) $n\pi \pm \frac{\pi}{2}; n \in z$ 2) $n\pi \pm \frac{\pi}{3}; n \in z$

3) $n\pi \pm \frac{\pi}{4}; n \in z$ 4) $n\pi \pm \frac{\pi}{6}; n \in z$

108. If the sum of acute angles $\tan^{-1}x$ and $\tan^{-1}\left(\frac{1}{2}\right)$ is 45^0, then the values os x is equal to

1) $\frac{1}{\sqrt{3}}$ 2) $\frac{1}{3}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\frac{1}{2}$

109. If $z_1 = 8+3i; z_2 = 9-2i$, then $\frac{z_1}{z_2} =$

1) $\frac{11}{15} + \frac{43}{85}i$ 2) $\frac{66}{85} + \frac{43}{85}ji$

3) $\frac{55}{85} + \frac{42}{85}i$ 3) $\frac{66}{85} + \frac{78}{85}i$

110. If $z_1 = 2+2i$ and $z_2 = 3i$, then $\arg z_1 z_2 =$

1) $\frac{3\pi}{2}$ 2) $\frac{3\pi}{4}$ 3) $\frac{-3\pi}{4}$ 4) π

A.P ECET- 2017

111. The value of $\tan 855^0$ ______

1) 1 2) $\frac{1}{\sqrt{2}}$ 3) -1 4) $-\frac{1}{\sqrt{2}}$

112. If $\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2m+1}$ then $\tan(\alpha+\beta)$

1) -1 2) 0 3) 1 4) 2

113. The value of $6\sin 20^0 - 8\sin^3 20^0 =$

1) 2 2) $\frac{1}{\sqrt{2}}$ 3) $\sqrt{3}$ 4) $\frac{1}{\sqrt{3}}$

114. If $3\sin\theta + 4\cos\theta = 5$ then the value of $4\sin\theta - 3\cos\theta =$

1) 0 2) -1 3) 1 4) 2

115. The sine function with period 3 is

1) $\sin\frac{2\pi x}{3}$ 2) $\sin\frac{\pi x}{3}$ 3) $3\pi x$ 4) $\frac{3\pi x}{2}$

116. The maximum value of $3\sin^2 x + 5\cos^2 x$ is____

1) 8 2) 3 3) 5 4) 34

117. The equation $\sqrt{3}$ sin x+cosx=4 has____

1) only one solution 2) two solutions

3) infinite solutions 4) no solutions

118. The solution of $\cos^{-1}(\sqrt{3}x) + \cos^{-1}x = \frac{\pi}{2}$ is

1) $\frac{1}{2}$ 2) $\frac{1}{5}$ 3) $-\frac{1}{2}$ 4) $-\frac{1}{5}$

119. The value of $\sin\theta + \sin(\theta + 120^0) - \sin(120^0 - \theta) =$

1) 0 2) $\sin\theta$ 3) 1 4) $-\sin\theta$

120. The principal solution of $3\operatorname{cosec} A = 4\sin A$ is ____

1) $\frac{\pi}{A}$ 2) $\pm\frac{\pi}{3}$ 3) $\pm\frac{\pi}{3}$ 4) $\pm 2\pi$

121. If $|z^2 - 1| = |z|^2 + 1$, then z lines in____

1) the real axis 2) a circle

3) the imaginary 4) a parabola

122. If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = a+ib$, then a an b are

1) 1,1 2) 2,-2 3) 0,-2 4) 0,-1

T.S ECET- 2017

123. If $\sin\theta + \operatorname{cosec}\theta = 2$, then the value of $\sin^3\theta + \operatorname{cosec}^3\theta =$

1) 0 2) 1 3) 2 4) 8

124. The value of $\sin^2\left(\frac{\pi}{8} + \frac{\theta}{2}\right) - \sin^2\left(\frac{\pi}{8} - \frac{\theta}{2}\right) =$

1) $\frac{1}{\sqrt{2}}$ 2) $\frac{1}{2}\sin\theta$ 3) $\frac{1}{\sqrt{2}}\sin\theta$ 4) $\sin\left(\frac{\theta}{2}\right)$

125. If x,y are in first quardrant, $\tan(x-y) = \frac{7}{24}$ and $\tan(x) = \frac{4}{3}$, then x+y=

1) $\frac{3}{4}$ 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{4}$ 4) 1

126. If $A - B = \frac{3\pi}{4}$, then (1-tanA) (1+tanB) =

1) 2 2) 1 3) 0 4) -1

127. $\sec^2(\tan^{-1}3) + \operatorname{cosec}^2(\cot^{-1}3) =$

1) 1 2) 10 3) 20 4) 30

128. $3\operatorname{cosec} x = 4\sin x \Rightarrow x =$

1) $n\pi \pm \frac{\pi}{2}; n \in z$ 2) $n\pi \pm \frac{\pi}{3}; n \in z$

3) $2n\pi \pm \frac{\pi}{2}; n \in z$ 4) $2\pi \mp \frac{\pi}{4}; n \in z$

129. If $\sinh x = \log_e(5+\sqrt{26})$, then x=

1) 5 2) 1 3) 2 4) $\log_e 5$

130. If a, b and c are the lengths of the sides opposite to the angles A,B and C of a triangle ABC, then $(b-c)^2 Cos^2\frac{A}{2}+(b+c)^2\sin^2\frac{A}{2}=$

1) a 2) b 3) b^2 4) a^2

131 If $z=2-i\sqrt{17}, then\ 2z^2-8Z+22=$

1) 0 2) 1 3) 2 4) 4

132. The least positive integer n, satisfying $\left(\frac{1+i}{1-i}\right)^n=1$ is

1) 2 2) 1 3) 4 4) 8

A.P ECET-2018

133. If $x+\frac{1}{x}=2\cos\theta$ then the value of $x^n+\frac{1}{x^n}$ is

1) $2\cos n\theta$ 2) $-2\cos n\theta$

3) $3\cos\theta$ 4) $2\sin n\theta$

134. The value of cot 2A+tan A=

1) sin 2A 2) cos2A 3) sec2A 4) cosec2A

135. The value of $\sin\frac{\pi}{5}\sin\frac{2\pi}{5}\sin\frac{3\pi}{5}\sin\frac{4\pi}{5}=$

1) $\frac{4}{15}$ 2) $\frac{5}{16}$ 3) $\frac{-5}{16}$ 4) $\frac{7}{15}$

136. If $\tan A=\frac{1}{2}$ and $\tan B=\frac{1}{3}$ then tan (A-B)=

1) $\frac{1}{7}$ 2) $\frac{-1}{7}$ 3) $\frac{1}{5}$ 4) $\frac{1}{3}$

137. The value of $\cos 20^0+\cos 100^0+\cos 140^0=$

1) 0 2) 3 3) 1 4) -3

138. The value of $(a-b)^2\cos^2\left(\frac{c}{z}\right)+(a+b)^2\sin^2\left(\frac{c}{z}\right)$ is

1) C^3 2) C 3) C^5 4) C^2

139. The value of $\frac{1-\cos 2A+\sin 2A}{1+\cos 2A+\sin 2A}=$

1) sinA 2) cosA 3) tanA 4) cotA

140. The general solution of $4\cos^2 x-3=0$ is

1) $2n\pi\pm\frac{\pi}{6}$ 2) $2n\pi\pm\frac{7\pi}{6}$

3) $3n\pi\pm\frac{5\pi}{6}$ 4) $2n\pi\pm\frac{11\pi}{6}$

141. The value of $2\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{1}{7}\right)$ is

1) $\pi/4$ 2) $\pi/2$ 3) $\pi/6$ 4) $\pi/3$

142. If $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=\frac{\pi}{2}$, then the value of xy+yz+zx is

1) -1 2) 3 3) 5 4) 1

143. The value of $\Sigma a\left(b^2+c^2\right)\cos A$ is

1) 2 abc 2) 4abc 3) 3abc 4) 5abc

144. The modulus of a complex number $\sqrt{3}+i$ is

1) -2 2) 3 3) 2 4) 5

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145. A complex number 'z' having least modulus value and satisfying $|z-2+2i|=1$ is____

1) $\left(2-\frac{1}{\sqrt{2}}\right)(1+i)$ 2) $\left(2+\frac{1}{\sqrt{2}}\right)(1+i)$

3) $\left(2-\frac{1}{\sqrt{2}}\right)(1-i)$ 4) $\left(2+\frac{1}{\sqrt{2}}\right)(1-i)$

146. The solution of the simultaneous equations $x+y=\frac{2\pi}{3}$ and $\cos x+\cos y=\frac{3}{2}$ where x and y are real is____

1) $x=\frac{\pi}{3}, y=\pi$ 2) $x=\pi, y=\frac{\pi}{3}$

3) $x=\pi, y=\frac{\pi}{2}$ 4) does not exist

147. If both the distinct roots of the equation $|\sin x|^2+|\sin x|+b=0$ in $[0,\pi]$ are real then all the values of b lie in the interval____

1) [-2, 0] 2) (-2,0)

3) [-2,0) 4) (-2,0]

148. $\frac{a\cos A+b\cos B+c\cos C}{2s}=$

1) Δ 2) $\frac{1}{R}$ 3) $\frac{r}{R}$ 4) $\frac{\Delta}{R}$

149. If $\cos A=\frac{3}{4}$, then the value of $32\sin\frac{A}{2},\sin\frac{5A}{2}$

1) 11 2) 36 3) 27 4) 10

150. If $z_1=3\left(\cos 15^0+i\sin 15^0\right)$ and $z_2=5\left(\cos 63^0+i\sin 63^0\right)$ then $\frac{z_1}{z_2}=$

1) $\frac{3}{5}\left[\cos 48^0+i\sin 48^0\right]$

2) $\frac{3}{5}\left[\cos 48^0-i\sin 48^0\right]$

3) $\frac{3}{5}\left[\cos 78^0+i\sin 78^0\right]$

4) $\frac{5}{3}\left[\cos 78^0-i\sin 78^0\right]$

151. $2Tan^{-1}\frac{1}{7}+Tan^{-1}\frac{1}{13}=$

1) $Tan^{-1}\frac{23}{61}$ 2) $Tan^{-1}\frac{14}{61}$

3) $Tan^{-1}\frac{32}{61}$ 4) $Tan^{-1}\frac{3}{51}$

152. If $\cos 20^0\cos 40^0\cos 80^0=p$, then p=

1) $\frac{1}{2}$ 2) $\frac{1}{4}$ 3) $\frac{1}{8}$ 4) 1

153. $\sin A\sin\left(120^0-A\right)\sin\left(120^0+A\right)=$

1) $\frac{1}{4}\sin A$ 2) $\frac{1}{4}\sin 3A$

3) $\frac{1}{4}\cos A$ 4) $\frac{1}{4}\cos 3A$

154. $\cos 5^0-\sin 25^0=$

1) $\sin 30^0$ 2) $\sin 35^0$

3) $\sin 45^0$ 4) $\sin 55^0$

PREVIOUS ECET QS KEY

01) 1	02) 3	03) 3	04) 3	05) 3
06) 4	07) 2	08) 2	09) 1	10) 3
11) 2	12) 1	13) 2	14) 2	15) 2
16) 1	17) 3	18) 1	19) 1	20) 1
21) 1	22) 3	23) 3	24) 2	25) 1
26) 2	27) 3	28) 4	29) 4	30) 2
31)	32) 3	33) 1	34) 2	35) 4
36) 1	37) 1	38) 4	39) 1	40) 4
41) 1	42) 3	43) 1	44) 2	45) 3
46) 4	47) 1	48) 3	49) 4	50) 2
51) 1	52) 4	53) 3	54) 4	55) 1
56) 3	57) 1	58) 3	59) 2	60) 3
61) 1	62) 3	63) 1	64) 3	65) 2
66) 2	67) 1	68) 1	69) 3	70) 1
71) 2	72) 3	73) 2	74) 2	75) 2
76) 2	77) 3	78) 2	79) 2	80) 4
81) 4	82) 3	83) 2	84) 4	85) 4
86) 4	87) 4	88) 4	89) 1	90) 3
91) 3	92) 4	93) 1	94) 3	95) 3
96) 2	97) 1	98) 2	99) 4	100) 3
101) 2	102) 1	103) 3	104) 1	105) 4
106) 3	107) 4	108) 2	109) 2	110) 3
111) 3	112) 3	113) 3	114) 1	115) 1
116) 2	117) 4	118) 1	119) 1	120) 2
121) 3	122) 3	123) 3	124) 3	125) 2
126) 1	127) 3	128) 2	129) 1	130) 4
131) 1	132) 3	133) 1	134) 4	135) 2
136) 1	137) 1	138) 4	139) 3	140) 1
141) 1	142) 4	143) 3	144) 3	145) 3
146) 4	147) 3	148) 3	149) 1	150) 2
151) 1	152) 3	153) 2	154) 2	

SPACE FOR IMPORTANT NOTES

ECET

CO-ORDINATE GEOMETRY

FOR SAIMEDHA STUDENTS ONLY

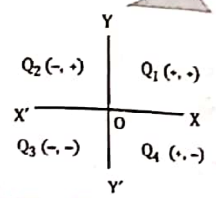
SAIMEDHA

MAKE ENGINEER-MAKE INDIA

ECET - GATE - ESE-PSU'S

7. STRAIGHT LINES

- Rene Descartes (1596 - 1650), a French Mathematician introduced Analytical Geometry by publishing "La Geometre" in 1637. It is often referred as "Cartesian Geometry".
- It is a method of studying geometry using a co-ordinate system. As such it is called "Co-ordinate Geometry.
- Abraham de Moivre developed Co-ordinate Geometry.
- A horizontal line XX^1 and a vertical line YY^1 intersect perpendicularly dividing a plane into four equal parts. And they are known as I, II, III & IV Quadrants.

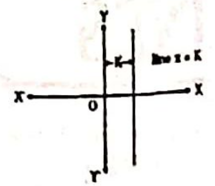


- The horizontal reference line xx' in a plane is Called X - axis and the vertical reference line yy' is Y - axis.
- X - axis and Y - axis combinely called coordinate axes.
- i) I quadrant contains (x, y) where $x > 0$ and $y > 0$.

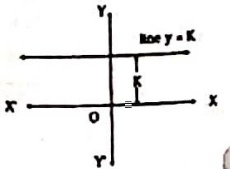
  ii) II quadrant contains (x, y) where $x < 0$ and $y > 0$.

  iii) III quadrant contains (x, y) where $x < 0$ and $y < 0$.

  iv) IV quadrant contains (x, y) where $x > 0$ and $y < 0$.
- $Q_1 \cap Q_2 = \phi$; $Q_2 \cap Q_3 = \phi$; $Q_3 \cap Q_4 = \phi$ an$Q_4 \cap Q_1 = \phi$.
- The point of intersection of X and Y axis is called "origin". The coordinates of origin are (0, 0).
- We denote a point in the plane by (x, y) where 'x' is known as X co-ordinate and Y is known as Y co-ordinate.
- X value of the point is known as "abscissa" and Y value of the point known as "ordinate".
- The points on the X - axis and Y - axis do not belong to any quadrant. A point A (x, y) lies on X-axis $\Leftrightarrow$ y = 0 and A (x,y) lies on Y axis $\Leftrightarrow$ x = 0.
- The angle between co-ordinate axes is 90°.
- The slope of the line is the tangent of the angle 'θ' made by the line with positive direction of X-axis . i.e., $m = \tan\theta$ where 'm' represents slope of the line.
- The inclination or angle made by a straight line with the positive X-axis is called the slope of the straight line.
- The slope of X- axis is '0'.
- The slope of a line parallel to X - axis is '0'.
- The slope of Y - axis is not defined.
- The slope a line parallel to Y - axis is not defined.
- Slope of any line perpendicular to X-axis is undefined.
- Slope of any line perpendicular to Y-axis is '0'.
- If A (x_1, y_1) and B (x_2, y_2) are the two points on a line then its slope $m = \dfrac{y_2 - y_1}{x_2 - x_1}$
- If two straight lines are parallel then their slopes are equal.
- If two straight lines are perpendicular then their product of their slopes is -1.
- A first degree equation in x, y represents a line and is $ax + by + c = 0$.
- The slope of the line $ax + by + c = 0$ is $-\dfrac{a}{b}$ and x - intercept is $-\dfrac{c}{a}$ and y - intercept is $-\dfrac{c}{b}$.
- Equation of a straight line parallel to Y-axis and is 'k' units distant from Y - axis is given as x=k.



- Equation of a straight line parallel to X-axis and is 'k' units distant from X-axis is given as y=k.



- The abscissa of a point is its perpendicular distance from Y - axis.
- The ordinate of a point is its perpendicular distance from X - axis.
- The distance between any two points in the plane is the length of the line segment joining them.
- The distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$ is $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ or $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$.
- Distance from origin (0, 0) to the point (x, y) is $\sqrt{x^2+y^2}$
- The distance between two points (x_1, y_1) and (x_2, y_2) on a line parallel to Y - axis is $|y_2-y_1|$ units.
- The distance between two points (x_1, y_1) and (x_2, y_2) on a line parallel to X - axis is $|x_2-x_1|$ units.
- If $A(x_1, y_1)$; $B(x_2, y_2)$ are any two points then the midpoint of segment joining A and B is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$
- The co-ordinates of the point dividing the line segment joining (x_1, y_1) and (x_2, y_2) externally in the ratio m : n is $\left(\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}\right)$
- The co-ordinates of the point dividing the line segment joining (x_1, y_1) and (x_2, y_2) internally in the ratio m : n is $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$
- If the line segment PQ is divided at points 'R' and 'S' so that PR, RS and SQ are equal, then R and S are called the points of trisectin of the line segment PQ. PQ is divided at R in the ratio 1 : 2 and at S in the ratio 2 : 1. If $P=(x_1, y_1)$ and $Q=(x_2, y_2)$ then $R=\left(\frac{2x_1+x_2}{3}, \frac{2y_1+y_2}{3}\right)$ and $S=\left(\frac{x_1+2x_2}{3}, \frac{y_1+2y_2}{3}\right)$
- The centroid of the triangle formed by the points $A(x_1, y_1)$; $B((x_2, y_2)$; $C(x_3, y_3)$ is $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$.
- The centroid of a triangle is the point of intersection of its medians. The centroid divides each median in the ratio 2 : 1.
- The centroid of a triangle trisects each median. If $A(x_1, y_1)$; $B((x_2, y_2)$; $C(x_3, y_3)$ are the vertices of a triangle then its area is

$$\Delta=\frac{1}{2}|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)|$$

$$=\frac{1}{2}\begin{vmatrix} x_1-x_2 & x_1-x_3 \\ y_1-y_2 & y_1-y_3 \end{vmatrix} \text{ sq. units}$$

$$= = \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix} \text{ sq. units}$$

- The area of a triangle having vertices (0,0) (x_1, y_1) and (x_2, y_2) is $=\frac{1}{2}|x_1y_2 - x_2 \ y_1|$.
- If G is the centroid of Δ ABC then $\Delta GAB = \Delta GBC = \Delta GCA = \frac{1}{3} \Delta ABC$.

- If D, E, F are the midpoints of BC, CA and AB of Δ ABC then $\Delta DEF = \Delta AEF = \Delta BDE = \Delta CDE = \frac{1}{4} \Delta ABC$.
- Three vertices of a triangle are said to be collinear if and only if the area of the triangle is O.
- If $A(x_1, y_1)$; $B(x_2, y_2)$; $C(x_3, y_3)$ and $D(x_4, y_4)$ are the vertices of a quadrilateral then its area is

$$\frac{1}{2}\begin{vmatrix} x_1-x_3 & x_2-x_4 \\ y_1-y_3 & y_2-y_4 \end{vmatrix} = \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix} \text{sq. units.}$$

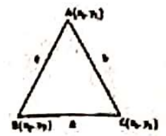
- Area of a triangle formed by the line ax + by + c = 0 with the coordinate axes $=\frac{1}{2}\left|\frac{c^2}{ab}\right|$ sq. units.
- Area of a triangle with vertices (0, 0); (x, 0) and (0, y) $=\frac{1}{2}|xy|$ sq. units.
- The ratio in which (x, y) divides the line segment joining (x_1, y_1) and (x_2, y_2) is $x_1 - x : x - x_2$
- Ratio in which X - axis divides the line segment joining (x_1, y_1) and (x_2, y_2) is $-y_1 : y_2$.
- The ratio in which Y - axis divides the line segment joining (x_1, y_1) and (x_2, y_2) is $-x_1 : x_2$
- 4th vertex of a parallelogram or rectangle or rhombus or square whose three consecutive vertices are (x_1, y_1), (x_2, y_2), (x_3, y_3) is .... $(x_1 + x_3 - x_2, y_1 + y_3 - y_2)$.
- If G is the centroid of a triangle ABC then $AB^2 + BC^2 + CA^2 = 3[AG^2 + BG^2 + CG^2]$.
- If D (x_1, y_1), E (x_2, y_2) and F(x_3, y_3) are the midpoints of the sides BC, CA, AB of Δ ABC then vertices are
  $A = (x_2+x_3-x_1, y_2+y_3-y_1)$;
  $B = (x_1+x_3-x_2, y_1+y_3-y_2)$;
  $C = (x_1+x_2-x_3, y_1+y_2-y_3)$.
- Equation of the line passing through the origin and having a slope 'm' is y = mx.
- Equation of the line having slope 'm' and making an intercept 'c' on Y - axis ($C \neq 0$) is y = mx+c.
- Equation of the line passing through a given point (x_1, y_1) and having slope 'm' is $y - y_1 = m(x - x_1)$.
- Equation of the straight line passing through (x_1, y_1) and (x_2, y_2) is $\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1}$.
- Equation of a straight line whose x - intercept is 'a' and y - intercept is 'b' is given by $\frac{x}{a}+\frac{y}{b}=1$.
- Slope of a line $\frac{x}{a}+\frac{y}{b}=1$ is $-\frac{b}{a}$
- Equation of the straight line passing through (x_1, y_1) and parallel to ax + by + c = 0 is $ax + by = ax_1 + by_1$.
- Equation of the straight line passing through (x_1, y_1) and perpendicular to ax + by + c = 0 is $bx - ay = bx_1 - ay_1$.
- Equation of X - axis is y = 0.
- Equation of Y - axis is x = 0.
- Reflection of the line y = k w.r.t. the X- axis is y = -k.
- Reflection of the line x = k w.r.t. the Y - axis is x = -k.
- The ratio that the line ax + by + c = 0 divides a line segment joining the points $A(x_1, y_1)$ and B $(x_2, y_2) = -\left[\frac{ax_1+by_1+c}{ax_2+by_2+c}\right]$
- The perpendicular distance from a point P (x_1, y_1) to the staright line ax + by + c = 0 is $\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$
- The distance between the rigin o (0,0) and the line ax + by + c = 0 is $\frac{|c|}{\sqrt{a^2+b^2}}$ units.
- The distance between the two parallel lines $ax + by + c_1 = 0$ and $ax + by + c_2 = 0$ is $\left|\frac{c_1-c_2}{\sqrt{a^2+b^2}}\right|$.
- If $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of a triangle then its incentre is $\left(\frac{ax_1+bx_2+cx_3}{a+b+c}, \frac{ay_1+by_2+cy_3}{a+b+c}\right)$

- If A (x_1, y_1) and B(x_2, y_2) are two points on a starigtht line $\overline{AB}$ parallel to X-axis then $y_1 = y_2$.
- If A (x_1, y_1) and B(x_2, y_2) are two points on a starigtht line $\overline{AB}$ parallel to Y-axis then $x_1 = x_2$.
- The positions of different points are given in the following table:

Co-ordinates of point	Location
$x > 0$ and $y > 0$	Q_1
$x < 0$ and $y < 0$	Q_2
$x < 0$ and $y < 0$	Q_3
$x > 0$ and $y < 0$	Q_4
$x = 0$ and $y > 0$	Ray of OY
$x = 0$ and $y < 0$	Ray of OY
$x > 0$ and $y = 0$	Ray of OX
$x < 0$ and $y = 0$	Ray of OX

- A set of points in a plane lie on a given straight line, then those points are said to be collinear. If three points A, B, C are collinear, then AB + BC = AC (or) AC + CB = AB (or) BA + AC = BC.
- When three points are given and it is required to prove that.
- To prove that three points (x_1, y_1), (x_2, y_2) and (x_3, y_3) form a triangle, prove that the sum of lengths of any two sides is greater than the length of third side.
  1) they form an isosceles triangle, shown that two of its sides are equal.
  2) they form an equilateral triangle, show that its three sides are equal.
  3) they form a right angled triangle, show that the sum of the square of two sides is equal to the square of the third side.
  4) they are collinear, show that the sum of the distance between two points pair is equal to the distance between the third point pair.
- When four points are given and it is required to prove that :
  1) they form a square, show that all sides are equal and diagonals are equal.
  2) they form a rhombus, show that all sides are equal but diagonals are unequal.
  3) they form a rectangle, show that the opposite sides are equal and diagonals are also equal.
  4) they form a parallelogram, show that the opposite sides are equal and diagonals are not equal.
- Parallelogram but not a rectangle prove that its opposite sides are equal but the diagonals are not equal.
- Rhombus but not a square prove that its all sides are equal but the diagonals are not equal.
- The area of right angled triangle ABC right angled at B is equal to $\frac{1}{2}$ (AB × BC)
- The area of an equirlateral triangle with side 'a' units $\frac{\sqrt{3}}{4}a^2$ sq. umts
- Area of a triangle using Heron's formula $A = \sqrt{S(S-a)(S-b)(S-c)}$ sq. units.
- The area of the triangle formed by the line $ax + by + c = 0$ with the coordinate axis is $\frac{c^2}{2|ab|}$ sq. units.
- If a line $\frac{x}{a} + \frac{y}{b} = 1$ meets the X- axis at A (a ,0) and the Y axis at (0,b) then ΔAOB is a right triangle
  1) the area of $\Delta AOB = \frac{1}{2}|ab|$ sq. units
  2) the circumcentre of $\Delta AOB = \left(\frac{a}{2}, \frac{b}{2}\right)$.
  3) the circum radius of $\Delta AOB = \frac{1}{2}\sqrt{a^2 + b^2}$
  4) the centroid of $\Delta AOB = \left(\frac{a}{3}, \frac{b}{3}\right)$.
  5) the orthocentre of $\Delta AOB = (0, 0)$.
- For an equilateral triangle orthocentre centroid crircumcentre and incentre will coincide.
- The slope of any line parallel to X -axis is zero. In particular the slope of X -aixs is zero. Slope of a line parallel to Y -aixs is not defined. In particular the slope of Y -axis is not defined.

- Two lines $y = m_1x + C_1$, $y = m_2x + C_2$ not parallel to the coordinate axes are perpendicular if the product of their slopes is equal to -1, i.e., $m_1m_2 = -1$.
- Let A (x_1, y_1), B (x_2, y_2) and C (x_3, y_3) are the vertices of a triangle.
  ΔABC then AB = c, BC = a and AC = b and
  $S = \frac{a+b+c}{2}$ (semi-perimeter).



Then area of $\Delta ABC = \sqrt{S(S-a)(S-b)(S-c)}$.
This is called Heron's formula.

- A straight line divides the coordinate plane into three mutually disjoint sets of points namely.
  i) The set of points on the straight line.
  ii) The set of points on the one side of the straight line.
  iii) The set of points on the other side of the straight line.
- A straight line divides the plane into two half planes.
- The ratio in which the straight line $L = ax + by + c = 0$ divides the line segment joining the points $A(x_1, y_1)$, and $B(x_2, y_2)$ is $\frac{-(ax_1 + by_1 + c)}{ax_2 + by_2 + c}$
- Let $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ be two non parallel lines. If (x_1, y_1) be the coordinates of their point of intersection then
  $$\frac{x_1}{b_1c_2 - b_2c_1} = \frac{y_1}{c_1a_2 - c_2a_1} = \frac{1}{a_1b_2 - a_2b_1}$$
- If θ is the acute angle between two straight lines with slopes m_1 and m_2 then $\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1m_2}\right|$.

SPACE FOR IMPORTANT NOTES

PRACTICE SET - I

01. A point on the Y-axis is of the form
1) (0, y) 2) (x, 0) 3) (x, y) 4) (y, y)

02. The point on Y-axis is
1) (2, 3) 2) (2, 0) 3) (4, 0) 4) (0, -3)

03. The distance of the point (x, y) from (0, 0) is
1) $\sqrt{x^2+y^2}$ 2) $\sqrt{x+y}$
3) $\sqrt{x}$-y 4) none

04. A point on the X-axis is of the form
1) (0, y) 2) (x, 0) 3) (x, y) 4) (x, x)

05. The slope of the points (4, 6), (2, -5) is
1) $\frac{6}{5}$ 2) $\frac{-11}{2}$ 3) $\frac{5}{6}$ 4) $\frac{11}{2}$

06. A point of X-axis is
1) (2, -3) 2) (8, 9) 3) (0, 7) 4) (3, 0)

07. AOBC is a rectangle whose three vertices are A(4, 0), B(0, 3) and O(0, 0), then its diagonal is
1) 4 2) 3 3) 5 4) 7

08. The condition for ax+by+c = 0 to represent a line always is
1) $|a|=|b|$ 2) $|a|+|b|=0$
3) $|a|+|b|\neq 0$ 4) $|a|<|b|$

09. Coordinates of origin are
1) (0, 7) 2) (8, 0) 3) (0, 0) 4) none

10. The perimeter of a triangle whose vertices are A(12, 0), O(0, 0) and B(0, 5) is ....
1) 13 2) 30 3) 34 4) 60

11. The Mathematician who introduced the coordinate geometry is
1) ramanujam 2) bhaskaracharya
3) george cantor 4) rene descartes

12. x>0, y>0 then (x, y) ∈
1) Q_4 2) Q_2 3) Q_3 4) Q_1

13. The distance of the point (-8, 3) from the origin is
1) $\sqrt{5}$ 2) $\sqrt{55}$ 3) $\sqrt{73}$ 4) $\sqrt{24}$

14. The centroid of the triangle, whose sides are given by x = 0, y = 0 and x+y = 6 is
1) (0, 0) 2) (2, 2) 3) (3, 3) 4) (6, 6)

15. Slope of X - axis is
1) 0 2) -1 3) 3 4) 7

16. Slope of vertical line is
1) 0 2) 7
3) -1 4) not defined

17. The distance of the point (-4, 3) from X -axis is
1) -4 2) -3 3) 4 4) 3

18. The distance between the points (a cos θ, 0), (0, a sin θ) is
1) |a| 2) $\sqrt{a}$ 3) a^2 4) 0

19. Slope of the line 3y = 2x is
1) 2 2) $\frac{2}{3}$ 3) $\frac{3}{2}$ 4) 1

20. The distance of the point (-8, -7) from Y-axis is
1) 8 2) -7 3) -8 4) 7

21. The slope of the line joining the points (3, -1) and (5, 3) is
1) 1 2) -1 3) 2 4) 1/2

22. x<0, y>0, then (x, y) ∈
1) Q_2 2) Q_3 3) Q_1 4) none

23. Slope of the line $\frac{x}{a}+\frac{y}{b}=1$ is
1) $\frac{1}{b}$ 2) $\frac{1}{a}$ 3) $\frac{a}{b}$ 4) $\frac{-b}{a}$

24. x = 0 represents
1) X-axis 2) Y-axis 3) (0, 0) 4) none

25. x<0, y<0, then (x, y) ∈
1) Q_1 2) Q_4 3) Q_2 4) Q_3

26. The points (-3, 0), (0, 5) and (3, 0) are the vertices of a .... triangle.
1) scalene 2) isosceles
3) equilateral 4) right angled

27. If the diagonals of parallelogram are equal, then the parallelogram is a
1) square 2) rhombus
3) circle 4) rectangle

28. Equation of Y-axis is
1) x = k 2) y = k 3) x = y 4) x = 0

29. The distance between the points (-2, 3) and (2, -3) is ....
1) 0 2) 52 3) $\sqrt{52}$ 4) 16

30. The midpoint of ($\sin^2\alpha$, $\sec^2\alpha$) and ($\cos^2\alpha$, $-\tan^2\alpha$) is
1) (1, -1) 2) (-1, 1) 3) (1, 1) 4) $\left(\frac{1}{2},\frac{1}{2}\right)$

31. Midpoint of the line joining the points (4, 3), (9, 3) is
1) $\left(\frac{1}{2},\frac{1}{2}\right)$ 2) $\left(\frac{7}{2},\frac{9}{2}\right)$ 3) $\left(\frac{13}{2},3\right)$ 4) none

32. If the distance between the points (4, y) and (1, 0) is 5, then y =
1) 0 2) 4 3) ±4 4) ±2

33. The coordinates of a point R that divides line joining P(3, 2) and Q(6, -1) internally in the ratio 1 : 2 is
1) (4, 1) 2) (1, 4) 3) (2, 4) 4) (4, 2)

34. The coordinates of the point which divides the line joining the points (8, 9) and (-7, 4) internally in the ratio 3 : 2 is
1) (1, 6) 2) (6, -1) 3) (-1, 6) 4) (1, -6)

35. The distance between the points (0, 7) and (-7, 0) is
1) $\sqrt{14}$ 2) 49 3) $2\sqrt{7}$ 4) $7\sqrt{2}$

36. A circle is drawn with origin as centre and passing through (2, 3), then its radius is .....
1) 2 2) 3 3) 13 4) $\sqrt{13}$

37. The area of the triangle formed by (a, b+c), (b, c+a) and (c, a+b) is
1) 2(a+b+c) 2) abc
3) 0 4) a+b+c

38. The ratio in which the X-axis divides the line joining the points (2, -5) and (1, 9) is
1) 9 : 5 2) 4 : 9 3) 5 : 4 4) 5 : 9

39. The centroid of the triangle is (1, 4) and two of its vertices are (4, -3) and (-9, 7), then the third vertex of the triangle is
1) (4, 1) 2) (8, 8) 3) (1, -4) 4) (-1, 4)

40. Centroid divides each median in the ratio
1) 1 : 2 2) 2 : 1 3) 1 : 1 4) 4 : 1

41. The line 2x+3y = 12 passes through
1) (8, 1) 2) (1, 3) 3) (0, 8) 4) none

42. The slope of a line is $\frac{-2}{3}$, then the slope of the line parallel to it is
1) $\frac{1}{2}$ 2) $\frac{1}{3}$ 3) $\frac{-2}{3}$ 4) 2

43. X - intercept of the line ax+by+c=0 is
1) $\frac{-c}{a}$ 2) $\frac{c}{a}$ 3) $\frac{a}{c}$ 4) $\frac{1}{c}$

44. Analytical geometry was introduced by
1) carton 2) lyar
3) thamus 4) rene descartes

45. Which of the following does not pass through (0, 0) ?
1) 3x = 4y 2) $x=\frac{1}{3}y$
3) 8x - 3y = 0 4) x+y+7=0

46. If the points (x, 0), (0, y) and (1, 1) are collinear, then $\frac{1}{x}+\frac{1}{y}=$
1) 1 2) -1 3) 0 4) 2

47. The value of 'a' if the points (5, 7), (a, 5) and (0, 2) are collinear is

1) 15 2) 3 3) $\frac{3}{22}$ 4) $\frac{22}{3}$

48. The point which divides the line segment joining the points (3, 4) and (7, -6) internally in the ratio 1 : 2 lies in the ...... quadrant.

1) Q_1 2) Q_2 3) Q_3 4) Q_4

49. If the points (x, 1), (1, 2) and (0, y+1) are collinear, then the value of $\frac{1}{x}+\frac{1}{y}=$

1) 1 2) 0 3) -1 4) $\frac{1}{2}$

50. Two intercepts form of a line is

1) $\frac{x}{a}+\frac{y}{b}=1$ 2) x-y=7

3) y = mx+c 4) none

51. Centroid of the triangle formed by the three vertices (x_1, y_1), (x_2, y_2) and (x_3, y_3) is

1) $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

2) $\left(\frac{x_1-x_2-x_3}{3}, \frac{y_1+y_2-y_3}{3}\right)$

3) $\left(\frac{2x_1+2x_2-x_3}{2}, \frac{2y_1+2y_2-y_3}{3}\right)$

4) none

52. The points (a, 2a), (3a, 3a) and (3, 1) are collinear, then k =

1) $\frac{-1}{4}$ 2) $\frac{1}{3}$ 3) $\frac{-2}{3}$ 4) $\frac{-1}{3}$

53. The distance between the points (0, 0) and (2, 4) is

1) $\sqrt{20}$ 2) 25 3) $\sqrt{5}$ 4) 16

54. P(2, 2), Q(-4, 4) and R(5, -8) are the verticles of a Δ PQR, then median from 'R' is

1) $\sqrt{147}$ 2) $\sqrt{157}$ 3) $4\sqrt{17}$ 4) $2\sqrt{13}$

55. The intersection point of X-axis and Y-axis is called

1) centroid 2) origin

3) intercept 4) orthocentre

56. The area of triangle formed with the vertices (-4, -1), (1, 2) and (4, -3) is----sq.units

1) 13 2) 12 3) 10 4) 17

57. A circle drawn with origin as centre passes through $\left(\frac{13}{2}, 0\right)$. The point which doesn't lie in the interior of the circle is

1) (-6, 3) 2) $\left(5, \frac{1}{2}\right)$

3) $\left(2, \frac{7}{3}\right)$ 4) $\left(\frac{-3}{4}, 1\right)$

58. The point on X-axis is

1) (0, 5) 2) (8, 18) 3) (5, 0) 4) (1, 1)

59. The distance of the point (-9, 40) from the origin is

1) 9 2) 40 3) 53 4) 41

60. In the coordinate plane the horizontal line is called

1) X-axis 2) Y-axis

3) origin 4) vertical line

61. If (-2, 8) and (6, -4) are the end points of the diameter of a circle then the centre of the circle is

1) (3, 6) 2) (4, 2) 3) (2, 2) 4) (-3, 2)

62. The distance of a point (α, β) from the origin is

1) $\alpha+\beta$ 2) $\alpha^2+\beta^2$

3) $\sqrt{\alpha^2+\beta^2}$ 4) $\sqrt{\alpha^2-\beta^2}$

63. The point on X-axis is

1) (4, 8) 2) (-1, 1) 3) (0, 2) 4) (3, 0)

64. The point (1, 2) lies in

1) Q_1 2) Q_2 3) Q_3 4) Q_4

65. The angle between X-axis and Y-axis is

1) 0^0 2) 180^0 3) 360^0 4) 90^0

66. The slope of the line passing through (0, 3) and (5, 7) is

1) 2 2) $\frac{4}{5}$ 3) $\frac{1}{2}$ 4) 4

67. The midpoint of the line joining of (2, 3) and (-2, -3) is

1) (0, 0) 2) (2, 3)

3) $\left(1, 1\frac{1}{2}\right)$ 4) $\left(-1, -1\frac{1}{2}\right)$

68. The centre of the circle (0, 0) and (3, -3) is a point on the circle, then its radius is

1) $3\sqrt{2}$ 2) $4\sqrt{2}$ 3) $5\sqrt{2}$ 4) $6\sqrt{2}$

69. If (3, -1), (2, 6) and (-5, 7) are the mid points of the sides of ΔABC, then area of ΔABC is .....sq. units

1) 96 2) 69 3) 86 4) 110

70. The slope of the line join of (5, -1), (0, 8) is

1) $\frac{7}{5}$ 2) $\frac{9}{5}$ 3) $\frac{-9}{5}$ 4) $\frac{-5}{9}$

71. The midpoint of the line joining the points (1, 2) and (3, 4) is

1) (1, 1) 2) (1, 2) 3) (1, 3) 4) (2, 3)

72. The distance between the points (3, 0) and (0, 5) is...... units

1) $\sqrt{19}$ 2) $\sqrt{34}$ 3) $\sqrt{17}$ 4) none

73. If x>0, y<0, then the point (-x, y) lies in

1) Q_1 2) Q_2 3) Q_3 4) Q_4

74. Slope of X-axis is

1) 0 2) 1

3) -1 4) not defined

75. Slope of Y-axis is

1) 1 2) -1

3) 0 4) not defined

76. The centroid of the triangle whose vertices are (2, -3), (4, 6), (-2, 8) is

1) $\left(\frac{8}{3}, \frac{17}{3}\right)$ 2) (4, 11)

3) (-3, -8) 4) $\left(\frac{4}{3}, \frac{11}{3}\right)$

77. If $\frac{x}{a}+\frac{y}{2a}=1$ passing through the point (1, -3), then the value of a is

1) $\frac{-1}{2}$ 2) $\frac{1}{2}$ 3) -2 4) 2

78. If (p, 2), (-3, 4), (7, -1) are collinear then P =

1) 0 2) -1 3) -2 4) 1

79. The slope of the line passing through $\left(\frac{c}{t_1}, ct_1\right)$ and $\left(\frac{c}{t_2}, ct_2\right)$ is

1) $t_1 t_2$ 2) $-t_1t_2$ 3) $\frac{1}{t_1t_2}$ 4) $\frac{-1}{t_1t_2}$

80. If the points $\left(at_1^2, 2at_1\right)$, $\left(at_2^2, 2at_2\right)$ and (a, 0) are collinear, then t_1t_2 =

1) -1 2) 1 3) 0 4) -2

81. Two vertices of a triangle are (3, 5) and (-4, -5). If the centroid of the triangle is (4, 3), find the third vertex.

1) (13, 9) 2) (-9, -13) 3) (9, 13) 4) (13, -9)

82. The ratio in which the point (4, 8) divide the line segment joining the points (8, 6) and (0, 10) is

1) 2 : 1 2) 1 : 1 3) 1 : 2 4) 3 : 1

83. If (0, 0), (a, 0) and (0, b) are collinear, then

1) ab = 0 2) a = b 3) a = -b 4) a-b=c

84. The ratio in which the line segment joining the points (-1, 3) and (4, -7) divided at the point (2, -3) is

1) 3 : 2 2) 2 : 3 3) 8 : 1 4) 1 : 4

85. In ΔABC, if AB = AC = BC then it is called ....triangle.
1) scalene 2) equilateral
3) isosceles 4) none

86. Y-intercept of the line $\frac{x}{a}+\frac{y}{b}$ is
1) -1 2) a 3) 1 4) b

87. Distance of the point (6, 8) from origin is ...... units
1) 9 2) 7 3) 10 4) none

88. If (-2, -1), (a, 0), (4, b) and (1, 2) are the vertices of a parallelogram then a, b are
1) 1, 3 2) 3, 1 3) -1, -3 4) -3, -1

89. Y-axis divides the join of (5, 7) and (-1, 3) in the ratio
1) 1 : 5 2) 5 : 1 3) -1 : 5 4) none

90. The point which divides the join of (-1, 2) and (4, -5) in the ratio 2 : 3 internally is
1) $\left(1,\frac{4}{5}\right)$ 2) $\left(-1,\frac{4}{5}\right)$
3) $\left(1,\frac{-4}{5}\right)$ 4) $\left(-1,\frac{-4}{5}\right)$

91. The quadrant in which the point (-2, 8) lies in
1) Q_1 2) Q_2 3) Q_3 4) Q_4

92. If A, B, C are collinear, then area of ΔABC = ...
1) 0 2) negative
3) positive 4) does not exist

93. The midpoint of A(0, 0) and B(6, 10) is
1) (-3, 5) 2) (3, -5) 3) (3, 5) 4) (-3, -5)

94. If a line make 'θ' with X-axis on the positive direction on then the slope of line is
1) $\sin\theta$ 2) $\cos\theta$ 3) $\tan\theta$ 4) $\cot\theta$

95. The midpoint of the sides of a qudrilateral are joined the figure formed is a
1) square 2) parallelogram
3) rectangle 4) rhombus

96. Area of the triangle formed by (-4, 0), (0, 0) and (0, 5) is (sq. units)
1) 10 2) 5 3) 15 4) 20

97. The value of p if the distance between (2, 3) and (p, 3) is 5 is
1) 4 2) -4 3) 7 4) -7

98. The value of k if the distance between (2, 8) and (2, k) is 3 is
1) 4 2) -4 3) -5 4) 5

99. A(0, -1), B(2, 1) and C(0, 3) are the vertices of the ΔABC, then median through B has a length .... units
1) 2 2) 3 3) 6 4) 9

100. The closed figure formed by the points (-2, 0), (2, 0), (2, 2), (0, 4) and (-2, 2) is a
1) quadrilateral 2) pentagon
3) hectagon 4) octagon

101. If Q, R, S are the points (-2, -1), (0, 3), (4, 0) respectively then, the coordinates of P such that PQRS is a parallelogram is
1) (2, 4) 2) (-2, 4) 3) (2, -4) 4) (-2, -4)

102. The slope of a line making an angle of 30° with the positive direction of X-axis is
1) $\frac{1}{\sqrt{3}}$ 2) $\sqrt{3}$ 3) 1 4) 0

103. The slope of the line joining the points (-a, a) and (a, a+a$\sqrt{3}$) is
1) $\frac{2}{\sqrt{3}}$ 2) $\frac{1}{\sqrt{3}}$ 3) $\sqrt{3}$ 4) $\frac{\sqrt{3}}{2}$

104. The point common to both the lines x-y+1=0 and x+y-2=0 is
1) $\left(\frac{1}{2},\frac{3}{2}\right)$ 2) $\left(\frac{1}{2},\frac{-3}{2}\right)$
3) $\left(\frac{-1}{2},\frac{3}{2}\right)$ 4) $\left(\frac{-1}{2},\frac{-3}{2}\right)$

105. The figure formed by the points (0, 3), (0, 0) and (4, 0) is a
1) scalene triangle 2) right angled triangle
3) equilateral triangle 4) isosceles triangle

106. If one end of the diameter of a circle is (a, b) and hte centre is (0, 0) then coordinates of the other end of the diameter is
1) (-a, -b) 2) (a, -b) 3) (-a, b) 4) (a, b)

107. The coordinates of the midpoint joining $P(x_1, y_1)$ and $Q(x_2, y_2)$ is
1) $\left[\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right]$ 2) $\left[\frac{x_1-x_2}{2},\frac{y_1-y_2}{2}\right]$
3) $\left[\frac{2x_1+x_2}{2},\frac{2y_1+y_2}{2}\right]$ 4) $\left[\frac{x_1+2x_2}{2},\frac{y_1+2y_2}{2}\right]$

108. The coordinates of the point which divides the line join of (x_1, y_1) and (x_2, y_2) in the ratio m : n internally is
1) $\left[\frac{mx_2+nx_1}{m+n},\frac{my_2-ny_1}{m-n}\right]$
2) $\left[\frac{mx_2-nx_1}{m-n},\frac{my_2+ny_1}{m+n}\right]$
3) $\left[\frac{mx_2-nx_1}{m-n},\frac{my_2-ny_1}{m-n}\right]$
4) $\left[\frac{mx_2+nx_1}{m+n},\frac{my_2+ny_1}{m+n}\right]$

109. The centroid divides each median in the ratio is
1) 1 : 2 2) 2 : 1 3) 3 : 1 4) 1 : 3

110. If the distance between the points (3, k) and (4, 1) is $\sqrt{10}$, then the value of k =
1) 4, -2 2) 4, 2 3) -4, 2 4) -4, -2

111. If the points (1, 2), (-1, x) and (2, 3) are collinear then the value of x is
1) 1 2) -2 3) 2 4) 0

112. If the centroid of the triangle formed with (a, b), (b, c) and (c, a) is O(0, 0) then $a^3+b^3+c^3$ =
1) abc 2) 2abc 3) -3abc 4) 3abc

113. The distance between the points (a cos θ, 0) and (0, a sin θ) is
1) a 2) a^2 3) a^3 4) a^4

114. If P(a, b), Q(a+3, b+4), R(a-1, b+7) are the three vertices of a parallelogram PQRS, then the coordinates of S
1) (a-4, b+3) 2) (a+4, b+3)
3) (a-4, b-3) 4) (a+4, b-3)

115. If the area formed by a triangle ABC is 64 sq. units, then the area formed by the midpoints of the sides of ΔABC is sq. units
1) 4 2) 8 3) 12 4) 16

116. If the points (k, 2k), (2k, 3k), (3, 1) are collinear, then k=
1) -2 2) 2 3) -1 4) 1

117. If the distance between (5, 2) and (3, k) is $\sqrt{8}$ units, then k is
1) (0, 4) 2) (0, -4) 3) (0, 2) 4) (0, -2)

118. In ΔABC, $\angle B=90^0$ then AB^2+BC^2 =
1) AC^2 2) 2AC 3) 3AC 4) $\frac{AC}{2}$

119. If G is the centroid of ΔABC, then ΔGAB =
1) $\frac{1}{13}\Delta ABC$ 2) $\frac{1}{4}\Delta ABC$
3) $\frac{1}{2}\Delta ABC$ 4) $\frac{1}{3}\Delta ABC$

120. If x<0, y<0 then (-x, -y) ∈
1) Q_2 2) Q_1 3) Q_3 4) none

121. If two lines are perpendicular then the product of their slopes is
1) 0 2) 7 3) 1 4) -1

122. Y-intercept of the line ax+by+c = 0 is
1) $\frac{-c}{b}$ 2) $\frac{c}{b}$ 3) c 4) b

123. Slope of the line 4x+3y = 9 is
1) $\frac{3}{4}$ 2) $\frac{-4}{3}$ 3) $\frac{1}{2}$ 4) $\frac{1}{3}$

124. Slope of the line $x=9$ is
1) 9　2) -9
3) 0　4) not defined

125. If the slope of the line joining the points (4, 2), (3, -x) is -2 then x =
1) -4　2) 4　3) 3　4) -3

126. The angle made by the line $\sqrt{3}x-y+5=0$ with positive direction of x-axis is
1) 30^0　2) 45^0　3) 60^0　4) 90^0

127. The point of intersection of medians of a triangle with vertices (-1, 2), (5, -2), (2, 3) is
1) (1, 2)　2) (2, 1)　3) (-1, 2)　4) (-2, 1)

128. The angle made by the line $x - \sqrt{3}y + 6 = 0$ with positive X-axis is
1) 30^0　2) 45^0　3) 60^0　4) 90^0

129. If (9, 3) and (1, -1) are the two ends of a diameter of a circle, then its centre is
1) (-5, 1)　2) (5, -1)　3) (-5, -1)　4) (5, 1)

130. The two lines x = 2 and y = -3 will meet at
1) (1, 8)　2) (2, 4)　3) (-2, 1)　4) (2, -3)

131. (-4, -3) ∈
1) Q_1　2) Q_2　3) Q_4　4) Q_3

132. A straight line parallel to x-y+1 = 0 is
1) 2x-2y+7=0　2) 2x-8y+1=0
3) 3x-2y+1=0　4) none

133. The line y = mx + c meets Y-axis at the point
1) (0, 0)　2) (c, 0)　3) (0, c)　4) (0, m)

134. General form of a straight line is
1) 3x+y=0　2) ax+b=0
3) 8x-9y=1　4) ax+by+c=0

135. Slope of the line 3y-2x+1=0 is
1) $\frac{3}{2}$　2) $-\frac{3}{2}$　3) $\frac{1}{3}$　4) $\frac{2}{3}$

136. The point which divides the line segment joining the points A(4, 6) and B(9, 2) in the ratio 3 : 4 externally is
1) (-11, 18)　2) (11, -18)
3) (-11, -18)　4) (11, 18)

PRACTICE SET-I-KEY

01–1	02–4	03–1	04–2	05–4
06–4	07–3	08–3	09–3	10–2
11–4	12–4	13–3	14–2	15–1
16–4	17–4	18–1	19–2	20–1
21–3	22–1	23–4	24–2	25–4
26–2	27–4	28–4	29–3	30–4
31–3	32–3	33–1	34–3	35–4
36–4	37–3	38–4	39–2	40–2
41–4	42–3	43–1	44–4	45–4
46–1	47–2	48–1	49–1	50–1
51–1	52–4	53–1	54–2	55–2
56–4	57–1	58–3	59–4	60–1
61–3	62–3	63–4	64–1	65–4
66–2	67–1	68–1	69–1	70–3
71–4	72–2	73–3	74–1	75–4
76–4	77–1	78–4	79–2	80–1
81–1	82–2	83–1	84–1	85–2
86–4	87–3	88–1	89–2	90–3
91–2	92–1	93–3	94–3	95–2
96–1	97–3	98–4	99–1	100–2
101–3	102–1	103–4	104–1	105–2
106–1	107–1	108–4	109–2	110–1
111–4	112–4	113–1	114–1	115–4
116–1	117–1	118–1	119–4	120–2
121–4	122–1	123–2	124–4	125–1
126–3	127–2	128–1	129–4	130–4
131–4	132–1	133–3	134–4	135–4
136–1				

To advance we must have faith in ourselves first and then in God. He who has no faith in himself can never have faith in God.

SELF TEST

01. The slope of the line $3x + y + 7 = 0$ is
1) 3　2) 7　3) -3　4) -7

02. The angle between the lines $x - 7y - 22 = 0; 7x + y - 54 = 0$ is
1) 45^0　2) 60^0　3) 90^0　4) 120^0

03. The angle between 5x + 3y -2 =0, 3x-ky +3=0 is 90^0, k =
1) -5　2) 5　3) 3　4) -3

04. General equation of any straight line passing through origin is
1) y = mx +c　2) y = mx
3) y = mx -c　4) y + mx = c

05. Slope of any line parallel to x- axis is
1) 90^0　2) 45^0　3) 60^0　4) 0^0

06. Equation of line with slope -4 and y intercept 3 is
1) $4x - y - 3 = 0$　2) $x + 4y - 3 = 0$
3) $4x + y = 3$　4) $4x + y = 0$

07. Centroid of triangle is (4, 1) two vertices are (2, 3), (7,6) the third vertex is
1) (3, 6)　2) (-3, 6)
3) (-3, -6)　4) (3, -6)

08. Value of k if the distance between (2, k), (4, 3) is 8
1) $3 \pm 2\sqrt{15}$　2) $5 + 2\sqrt{15}$
3) $4 + 2\sqrt{15}$　4) $2 + \sqrt{15}$

09. Area of triangle formed by (1, 2) (3,-4), (5, -6) is
1) 6 sq. unit　2) 5 sq.unit
3) 4 sq. unit　4) 8 sq. unit

10. The equation of the line joining (4, -7) and (1, -5) is
1) 2x-3y+13 = 0　2) 2x-3y-13 = 0
3) 2x + 3y + 13 = 0　4) 2x +3y-13 = 0

11. Area of rhomubs is 24sq. cm. one diagnal is 8 cm. The length of the other diagonal and side are
1) 7, 6　2) 6, 5　3) 3, 8　4) 6, 4

12. The centre of circle is (0, 0) and one end of the diamter is (4, 5), then the other end of the diameter
1) (0, 0)　2) (-4, -5)　3) (4, 5)　4) $\left(2, \frac{5}{2}\right)$

13. If R = 5, r = 3 are radii and d = 6 is the distance between their centres number of common tangents that can be drawn
1) 1　2) 2　3) 3　4) 4

14. The point which satisfies 3x+4y 11 is
1) (-1, 4)　2) (3, 4)　3) (1, 6)　4) (1, 2)

15. The slope of the line ax + by + c = 0 is
1) a/b　2) b/a　3) -b/a　4) -a/b

16. Centroid of triangle is (4, 1), two verices are (2, 3), (7, 6) then the third vertex is
1) 3, 6　2) -3, 6　3) -3, -6　4) 3, -6

17. y intercept is -4/3; parallel to 4x-3y+7=0; equation of such straight line is
1) 4x-3y=4　2) 4x+3y=4
3) 3x-4y=4　4) 3x-4y+1=0

18. The ratio that (4, 5) divides the line joining (2, 3) and (7, 8) is
1) 2 :7　2) 3 : 8　3) 7 : 8　4) 2 : 3

19. (-5, 12), (-2, -3), (9, -10) are the three vertices of a triangle, then the centriod of the triangle is
1) (1/3, 2/3)　2) (2/3, -1/3)
3) (1/3, 4/3)　4) (2/3., 4/3)

20. A (4, 5), B (2, -1) are two vertices G (1, 1) is the centroid of triangle ABC, the area of triangle of ABC is
1) 5　2) 15　3) 25　4) 30

21. General equation of any straight line passing through origin is
1) y = mx+c　2) y = mx
3) y = mx - c　4) y + mx = c

22. If (-1, 5) is mid point of line joining the point (-4, a) (2, 8) then the value of a is
1) 4　2) 3　3) 2　4) 1

23. $A(-2,3), B(1,2), C(7,0) \Rightarrow AB + BC =$
1) $\sqrt{10}$　2) $2\sqrt{10}$
3) $3\sqrt{10}$　4) $4\sqrt{10}$

24. The slope of a line parallel to the line 3x+2y+7=0
1) $\frac{3}{2}$　2) $\frac{2}{3}$　3) $-\frac{2}{3}$　4) $-\frac{3}{2}$

25. If $(1, 2), (-3, 4)$ and $(7, -k)$ are collinear, k=?
1) 2   2) -1   3) 0   4) 1

26. A(4, 3), B (3, 4), C(-3, -4) are vertices of a triangle. The median through A on BC is
1) 5   2) 3
3) 4   4) 2

27. A point which is not on $x + y = 6$ is
1) (3, 3) 2) 2, 4) 3) (3, 2) 4) (4, 2)

28. If (x,y) is equidistant from (6, -1) and (2, 3) then relation between x, y is
1) x-y=3   2) x-y = 12
3) x = y   4) x + y + 3=0

29. The triangle with vertices A (0, 0), B (2, 2) and C (0, 4) is.....triangle
1) right angled
2) right angled isosceles
3) equilateral   4) isosceles triangle

30. The point of intersection of the equations 2x+3y =8 and 4x-y=2 is
1) (-1, -2) 2) (-1, 2) 3) (1, -2) 4) (1, 2)

31. The equation of the line through (2, 0) with slope 3 is
1) 3y = x -2   2) y = 3x - 6
3) 3y = x +6   4) y = 3x+ 6

32. $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ are vertices of a triangle, the centroid is
1) $\left(\frac{\sum x_1}{3}, \frac{\sum y_1}{3}\right)$
2) $\left(\frac{x_1 - x_2 - x_3}{3}, \frac{y_1 - y_2 + y_3}{3}\right)$
3) $\left(\frac{x_1 + x_2 - x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$
4) $\left(\frac{x_2 + x_3 - x_1}{3}, \frac{y_2 + y_3 - y_1}{3}\right)$

33. The point which belongs to 5x - 4y -9 > 0 is
1) (4, 5) 2) (5, 4) 3) 6, 4) 4) 6, 7)

34. The two triangles on the same base and equal area lie between
1) same parallel lines
2) two straight lines
3) perpendicular lines
4) intersecting lines

35. The point which satisfies $4x - 3y + 12 > 0$ is
1) (-4,2) 2) (1,6) 3) (4,8) 4) (-1,-4)

36. (a, 0) (0, b) (1, 1) points are collinear. Condition is
1) $\frac{1}{a} - \frac{1}{b} = 1$ 2) $\frac{1}{a} + \frac{1}{b} = 1$
3) $\frac{1}{a} + \frac{1}{b} + 1 = 0$ 4) $\frac{1}{a} - \frac{1}{b} - 1 = 0$

37. D(3, -1), E(2, 6), F(-5, 7) are the midpoints of sides AB, BC, CA respectively. Then area of the ΔABC is
1) 24   2) 16   3) 36   4) 96

38. A point which is not on $x + y = 6$ is
1) (3, 3)   2) (2, 4)
3) (3, 2)   4) (4, 2)

39. Line makes 120^0 with X-axis. Its slope is
1) $\frac{1}{\sqrt{3}}$ 2) $\sqrt{3}$ 3) $-\frac{1}{\sqrt{3}}$ 4) $-\sqrt{3}$

40. If (2, 3) is one end of diameter of circle centre (0, 0) the other end is
1) (2, 3) 2) (-2, -3) 3) (2, 0) 4) (0, 3)

41. The point of intersection of the equations 2x+ 3y =8, 4x - y = 2 is
1) (-1, -2)   2) (-1, 2)
3) (1, -2)   4) (1, 2)

42. Equation of perpendicular bisector of line joining (10, 5), (-4, 9) is
1) 7x + 2y =7   2) 7x - 2y =7
3) 2x + 7y =7   4) 2x -7y =7

43. Equation of the line through (1, 3) and perpendicular to the line joining the points (3, -5) (5, 7) is
1) x + 6y + 19 =0   2) x + 6y = 19
3) 6x + y =19   4) 6x -y = 19

44. Number of common tangents that can be drawn to two circle which do not touch
1) 2   2) 4   3) 3   4) 1

45. The height of an equilateal triangles is $\sqrt{3}$, the area of the triangle is
1) $\sqrt{3}$ 2) 3   3) $3\sqrt{3}$ 4) $2\sqrt{3}$

46. If $3a^3 + 2b^2 + c = 0$, then the line $a^3x + b^2y + c = 0$ passes through
1) (a^3, b^2) 2) $(3a^3, 2b^2)$ 3) $(2a^3, 3b^2)$ 4) (3,2)

47. Area of the triangle formed by the line x cos $\alpha + y$ sin α =p with the co-ordinate axes is
1) $\frac{p^2}{\sin\alpha}$ 2) $\frac{p^2}{\cos\alpha}$
3) $\frac{p^2}{\sin\alpha.\cos\alpha}$ 4) $\frac{p^2}{2.\sin\alpha.\cos\alpha}$

48. Point of intersection of the lines 2007x + 2008y = 4015 and x + y = 2 is
1) (1, 2007)   2) (2008, 1)
3) (1, 1)   4) (2007, 2008)

49. The number of points on X-axis which are at a distance of 5 metres from origin is
1) 1   2) 2   3) 3   4) ∞

50. Slope of the line x = 7y + 9 is
1) 7   2) -7   3) $-\frac{1}{7}$ 4) $\frac{1}{7}$

51. Centroid of the triangle formed by the co-ordinate axes and the line x + y =6 is
1) (3, 3) 2) (2, 2) 3) (1, 1) 4) (0, 0)

52. The line x = my + c cuts Y-axis at
1) $\left(0, \frac{c}{m}\right)$ 2) $\left(0, -\frac{c}{m}\right)$
3) $\left(0, \frac{m}{c}\right)$ 4) $\left(0, -\frac{m}{c}\right)$

53. Equation of the line passing through the ponits (0, 0), $(a\cos\alpha, b\sin\alpha)$ is
1) ay = (b tan α)x   2) by = (a tan α)x
3) by + (a tan α) x = 0
4) ay + (b tan α) x = 0

54. If (1, 5) is mid point of line joining (-5, 3), (7, k), then k =
1) -7   2) 7   3) 5   4) -1

55. A line passes through the points (1947, 1957), (1869, 1879), (1857, 1867). Its equation is
1) y = x + 1947   2) x = y + 1957
3) y = x + 10   4) x = y + 10

56. If $\frac{1}{p} + \frac{1}{q} = 1$, then the line $\frac{x}{p} + \frac{y}{q} = 2$ passes through
1) (1, 1) 2) (1, 2) 3) (2, 1) 4) $\left(\frac{1}{2}, \frac{1}{2}\right)$

57. Equation of a line passing through the point (2007, 2008) and parallel to X-axis is
1) y = 2007   2) y = 2008
3) x = 2007   4) x = 2008

58. If the line ax + by + c = 0 is parallel to X - axis, then
1) a = 0   2) b = 0   3) c = 0   4) none

59. (p+1)x + (p+2)y + (p+3) = 0 passes through (1, 1), then 2p + 5 =
1) 0   2) -2   3) 1   4) none

60. If 2a + 3b = ab, then the line $\frac{x}{a} + \frac{y}{b} = 1$ passes through
1) (2, 3) 2) (3, 2) 3) (2, 2) 4) (3, 3)

61. If (a, 2), (-3, 4), (7, -1) are collinear, then a=
1) 0   2) 1   3) 2   4) -1

62. If the slope of the line is 3 and X-intercept is 2, then Y-intercept
1) 3   2) 2   3) 6   4) -6

63 Two parallel lines are =
1) x + y = 1, 3x + y =1
2) x + y =1, x + 3y = 1
3) x + y=1, 3x + 3y =1
4) none

64. Equation of the line passing through points (14, 7), (-36,-18), (4020, 2010) is
1) $\frac{x}{2} - \frac{y}{1} = 0$ 2) $\frac{x}{1} - \frac{y}{2} = 0$
3) $\frac{x}{2} - \frac{y}{1} = 0$ 4) $\frac{x}{1} - \frac{y}{2} = 1$

65. Area of the triangle formed by the points (-37,3.), (-12, 28), (4, 44) is.......sq. units
1) 289   2) 738   3) 0   4) 1263

66. Three consecutive vertices of a parallelogram are (7, 3), (-2, 4), (3, -5). The fourth vertex is
1) (-12, 6)   2) (12,-6)

3) (-12,-6) 4) (12, 6)

67. The lines $p_1x - q_1y + r_1 = 0$,

$p_2x - q_2y + r_2 = 0$ are perpendicular if

1) $p_1p_2 - q_1q_2 = 0$ 2) $p_1p_2 + q_1q_2 = 0$

3) $p_1p_2 - q_2q_1 = 0$ 4) $p_1p_2 + q_2q_1 = 0$

68. The triangle formed by the points (2009, 0) (0, 2010), (0, 0) is

1) equilateral 2) right angled

3) acute angled 4) none

69. If the line y = mx + c passes through (0, 3), (7, 0), then m + c =

1) 18 2) 7 3) $\frac{18}{7}$ 4) none

70. Slope of the line 2y + 1 = x is

1) 2 2) -2 3) $\frac{1}{2}$ 4) $-\frac{1}{2}$

71. General equation of the line passing through origin is

1) y = cx + m 2) y = mx - c

3) y = px 4) none

72. Equation of the line with intercepts 1, 1 is

1) $\frac{x}{a}+\frac{y}{b}=1$ 2) $\frac{x}{1}+\frac{y}{1}=1$

3) x + y = 0 4) none

73. If the lines 7x-y+11=0 and px+qy=1 are parallel then $\frac{p}{q}$ =

1) $\frac{-1}{7}$ 2) $\frac{1}{7}$ 3) 7 4) -7

74. Two perpendicular lines are

1) x+2y=1, x+3y=1

2) 3x+2y=1, 2x+3y=1

3) 7x-5y=2, 5x-7y=2

4) none

75. Centroid of the triangle formed by the points (3, 2), (-1,5)(11, 0) is

1) $\left(\frac{7}{3},\frac{13}{3}\right)$ 2) $\left(\frac{13}{3},\frac{7}{3}\right)$

3) $\left(\frac{13}{3},\frac{7}{3}\right)$ 4) $\left(-\frac{13}{3},\frac{7}{3}\right)$

76. If a line is perpendicular to 7x - 2y + 2011 = 0, then its slope is

1) $\frac{2}{7}$ 2) $-\frac{2}{7}$ 3) $-\frac{7}{2}$ 4) $\frac{7}{2}$

77. Distance of the point ($a\sin\alpha, a\cos\alpha$) from origin is

1) 0 2) a 3) 2a 4) none

78. The points (-14, 1), (39, 54), (187, 202) are

1) collinear 2) non-collinear

3) form a right angled triangle

4) none

79. If the lines x + Ky = 1 and 2x-3y=1, are perpendicualr, then K =

1) $\frac{2}{3}$ 2) $-\frac{2}{3}$ 3) $\frac{3}{2}$ 4) $-\frac{3}{2}$

80. Two parallel lines are

1) x + y = 1, 3x + 3y = 2

2) x - y = 1, 3x + 3y = -2

3) x+y = 1, 3x-3y = 2

4) none

81. If a+b=1, then the points intersection of the lines ax + by = bx + ay = 1 is

1) (a, b) 2) (b, a) 3) (1, 1) 4) none

82. Point of intersection of the lines x + y = 2012 ; x - y = 1 is

1) (2012, 1) 2) (1, 2012)

3) (2012, 2011) 4) none

83. Slope intrecept form of the line $\frac{x}{a}+\frac{y}{b}=1$ is

1) $y=-\frac{b}{a}x-b$ 2) $y=-\frac{b}{a}x+b$

3) $y=-\frac{b}{a}x+a$ 4) $y=-\frac{b}{a}-a$

84. The line y = x + 1 passes through the points

1) (2011, 2012), (2012, 2013)

2) (2009, 2011), (2013, 2015)

3) (2012, 2011), (2011, 2013) 4) none

85. Slope of the line $\frac{2x}{3}+\frac{3y}{2}+2012=0$

1) $\frac{4}{9}$ 2) $-\frac{4}{9}$ 3) $\frac{9}{4}$ 4) $\frac{9}{4}$

86. Area of the triangle formed by the points (-194, -167), (4, 31), (83, 110) is

1) 411 sq. units 2) 413 sq. units

3) 417 sq. units 4) none

87. If $\frac{16}{2+7}+\frac{16}{b+7}=1$ then line $\frac{x}{a+7}+\frac{y}{b+11}=\frac{1}{4}$ passes through

1) $\left(\frac{1}{a+7},\frac{1}{b+11}\right)$ 2) $\left(\frac{1}{4(a+7)},\frac{1}{4(b+11)}\right)$

3) $\left(\frac{4}{a+7},\frac{4}{b+11}\right)$

4) (4, 4)

88. General form of the line y = 2x + 3 is

1) y = 2x - 3 2) y = 3x -2

3) 2x - y+ 3 = 0 4) none

89. Intercepts made by the line y = 5x - 1 on the coordinate axes are

1) $\frac{1}{5},1$ 2) $-\frac{1}{5},1$ 3) $\frac{1}{5},-1$ 4) $-\frac{1}{5},\frac{1}{5}$

90. Area of the triangle formed by the line $\frac{x}{4}+\frac{y}{7}=1$ with the coordinate axes is

1) 28 sq.units 2) 14 sq. units

3) 56 sq. units 4) none

91. Among the following, two parallel lines are

1) 2x + 2y + 13 = 0, x + 2y + 11 = 0

2) 3x + 3y + 11 = 0, x + y + 11 = 0

3) 3x - 2y + 1 = 0, 4x -3y + 2 = 0 4) none

92. Equation of the altitude through (8, 2) of the triangle formed by the points (8, 2), (4, 6), (-1, 5) is

1) x - 5y -42 = 0 2) x + 5y + 42 = 0

3) 5x + y-42 = 0 4) 5x + y + 42 = 0

93. The points A (3, 4), B (2,-1), C(-4, 3) form a triangle. If D and E are the midpoints of AB and AC respectively, then the slope of the line DE is

1) $\frac{2}{3}$ 2) $-\frac{2}{3}$ 3) $\frac{3}{2}$ 4) $-\frac{3}{2}$

94. $(x+1)^2+(y+2)^2=25\Rightarrow$

1) $x=25\cos\theta-1, y=25\sin\theta-2$

2) $x=5\cos\theta+1, y=5\sin\theta+2$

3) $x=5\cos\theta-1, y=5\sin\theta-2$ 4) none

95. $(x-3)(y-4)=49\Rightarrow$

1) $x=3\cos\theta+7, y=4\sec\theta+7$

2) $x=7\cos\theta+3, y=7\sec\theta+4$

3) $x=3\cos\theta-7, y=4\sec\theta-7$

4) $x=7\cos\theta-3, y=7\sec\theta-4$

96. $(x+1)(y+3)=25\Rightarrow$

1) $x=\sin\theta+5, y=\operatorname{cosec}\theta+5$

2) $x=5\sin\theta-1, y=5\operatorname{cosec}\theta-3$

3) $x=\sin\theta-5, y=\operatorname{cosec}\theta-5$

4) $x=5\sin\theta+1, y=5\operatorname{cosec}\theta+3$

97. $(x-2)^2-(y-3)^2=16\Rightarrow$

1) $x=2\sec\theta+4, y=2\tan\theta+4$

2) $x=4\sec\theta+2, y=4\tan\theta+3$

3) $x=2\sec\theta-4, y=2\tan\theta-4$

4) $x=4\sec\theta-2, y=4\tan\theta-3$

98. The centroid of the triangle whose vertices are (1, 4), (1,-1) (3,-2) is

1) (1,-3) 2) $\left(1,\frac{1}{3}\right)$ 3) $\left(1,-\frac{1}{3}\right)$ 4) $\left(-1,\frac{1}{3}\right)$

99. The area of a triangle whose vertices are A(3, 2), B (11,8) and C(8, 12) is

1) 23 2) 24 3) 25 4) 26

100. The distance between the points $(a\cos 25^0, 0)$ and $(0, a\cos 65^0)$ is

1) a 2) 2a 3) 3a 4) 0

101. The coordinates of the point which divides the line joining the points (2, -4) and (5, 6) in the ratio 5:3 are

1) $\left(\frac{19}{2},-21\right)$ 2) $\left(-\frac{19}{2},-21\right)$

3) $\left(-\frac{19}{2},21\right)$ 4) $\left(\frac{19}{2},21\right)$

102. If 2x - 3y + 5 = 0 and 4x + ky-2 = 0 are two parallel lines, then the value of k is
1) -6 2) -3 3) 3 4) 6

103. The point on the line 2x - 3y = 5 which is equidistant from (1, 2) and (3, 4) is
1) (2, 3) 2) (4, 1) 3) (1, -1) 4) (4, 6)

104. The triangle formed by the points (0, 5), (5, 0) and (0, 0) is a/an
1) equivalent triangle 2) isosceles triangle
3) scalene triangle 4) right-angled triangle

105. The slope intercept form of the line ax + by + c=0
1) $y+\frac{ax}{b}+\frac{c}{b}=0$ 2) $y-\frac{ax}{b}+\frac{c}{b}=0$
3) $y+\frac{ax}{b}-\frac{c}{b}=0$ 4) $y-\frac{ax}{b}-\frac{c}{b}=0$

106. The equation of the line passing through (1, 2) and perpendicular to x + y + 1 =0 is
1) y - x + 1 = 0 2) y - x - 1 = 0
3) y - x - 2 = 0 4) y + x - 2 = 0

107. The line joining (-1, 0) and $\left(-2,-\sqrt{3}\right)$ makes an angle of .....with x - axis
1) 30^0 2) 45^0 3) 60^0 4) 75^0

108. If (1, 2), (-1, 4) and (7, -k) are collinear, then k =
1) 1 2) -1 3) 2 4) 4

109. The slope of the line which makes $\frac{3\pi}{4}$ with the +ve direction of x-axis is
1) 1 2) -1 3) 2 4) 3

110. The nature of the line 7x + 5y + 6 = 0 and 5x - 7y + 6 = 0 is
1) parallel 2) concurrent
3) perpendicular 4) none

111. The equation of the striaght line parallel to 4x+3y +5 = 0 and passing through (1, 1) is
1) 4x + 3y =7 2) 3x - 4y =7
3) 3x + 4y -5 =0 4) 4x -3y -5 = 0

112. The triangle formed by (-2, 2), (8, -2) and (-4, -3) is
1) scalene 2) isosceles
3) equilateral 4) right - angled

113. The centre of a circle is (0, 0). If (3, 2) is one end of a diameter, then the other end is
1) (-3, -2) 2) (3, -2)
3) (-3, 2) 4) $\left(\frac{1}{3},\frac{1}{2}\right)$

114. If A(-1, 3); B(-3, 7); C(1, -1), then A divides BC in the ratio
1) 1 : 2 2) 3 : 2 3) -2 :3 4) none

115. The equation of the line passing through (-1, -3) and subtending an angle $\frac{\pi}{3}$ with x-axis in the +ve direction is
1) $x-\sqrt{3}y=3-\sqrt{3}$ 2) $\sqrt{3}x-y=0$
3) $x-\sqrt{3}y=0$ 4) $3x-y=3-\sqrt{3}$

116. The equation of the line passing through the point of intersection of the lines 2x+y+1=0, x-y-7=0 and the point (3, -2) is
1) 3x+y+11 =0 2) 3x - y+11=0
3) 3x-y-11=0 4) 3x+y=11=0

117. The angle between the line joining the points (1, -2), (3, 2) and the line x +2y -7=0 is
1) $\frac{\pi}{3}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{2}$

118. The area of the triangle formed by the line x cos $\alpha+y\sin\alpha=p$ with the cordinate axes is
1) $\frac{p^2}{\sin\alpha}$ 2) $\frac{p^2}{\cos\alpha}$
3) $\frac{p^2}{\sin\alpha\cos\alpha}$ 4) $\frac{p^2}{2\sin\alpha\cos\alpha}$

119. The points where the line x = my + c cuts x and y axes are
1) $(c,0),\left(0,\frac{-c}{m}\right)$ 2) $(0,c),\left(\frac{c}{m},0\right)$
3) $\left(-\frac{c}{m},0\right),(0,c)$ 4) $\left(c,-\frac{c}{m}\right),(0,0)$

120. The equation of the line passing through (0, 0) and $(a\cos\alpha, b\sin\alpha)$ is
1) ay = bx and α 2) by = ax tan α
3) by = -ax tan α 4) ay = -bx tan α

121. The area of the triangle formed by (a,b +c), (b, c+a) and (c, a+ b) is
1) a+b+c sq units 2) abc sq units
3) $(a+b+c)^2$ sq units
4) 0 sq units

122. The nearest point from the origin is
1) (2, -1) 2) (3, -1)
3) (5, 0) 4) (2, -3)

123. If the points (a, 0), (0, b) and (1, 1) are collinear, then $\frac{1}{a}+\frac{1}{b}=$
1) -1 2) 2 3) 0 4) 1

124. The equation of a striaght line passing through the points (4, -7) and (1, -5)
1) 2x+3y-13=0 2) 2x-3y+13=0
3) 2x+3y+13=0 4) 2x-3y-13=0

125. The slope of the line which is parallel to 3x -2y+ 1=0 is
1) -3/2 2) 3/2 3) 2/3 4) -2/3

126. The distance between the points (acos $\theta+b\sin\theta$, 0) and $(0, a\sin\theta-b\cos\theta)$ is
1) a^2+b^2 2) a+b
3) $\sqrt{a^2-b^2}$ 4) $\sqrt{a^2+b^2}$

127. A triangle formed by the points A (a, 0), B(-a, 0) and $C\left(0,a\sqrt{3}\right)$ is
1) a right-angled triangle
2) an isosceles triangle
3) an equilatral triangle 4) a scalene triangle

128. The area of the quadrilateral whose vertices taken in order are (-4, -2), (-3, -5), (-3, -2) and (2, 3) is sq. units
1) 56 2) 28 3) 84 4) none

129. If the points A(x,-1), B(2, 1) and C(4, 5) are collinear, then x =
1) 1 2) -1 3) 0 4) 2

130. The perimeter of the triangle formed by the points (-a, 0), (a, 0) and (0, a) is
1) $2a\left(1+\sqrt{2}\right)$ 2) $a\left(2+\sqrt{2}\right)$
3) $2a\left(a+\sqrt{2}\right)$ 4) none

131. If a line makes 60^0 with positive x-axis, then its slope is
1) $1/\sqrt{3}$ 2) 1 3) $\sqrt{3}$ 4) $-\sqrt{3}$

132. The points A(1, 7), B(4, 2), C(-1, 1) and D(-4, 4) are
1) collinear 2) vertices of a square
3) vertices of a rectangle
4) none of these

133. If P divides the line joining $A(x_1,y_1)$ and $B(x_2,y_2)$ internally in the ratio $m_1:m_2$ then P is
1) $\left(\frac{m_1x_2+m_2y_2}{m_1-m_2},\frac{m_1x_1+m_2y_2}{m_1-m_2}\right)$
2) $\left(\frac{m_1x_1+m_2x_2}{m_1-m_2},\frac{m_1y_1+m_2\times y_2}{m_1-m_2}\right)$
3) $\left(\frac{m_1x_2+m_2x_1}{m_1+m_2},\frac{m_1y_2+m_2y_1}{m_1-m_2}\right)$
4) $\left(\frac{m_1x_2-m_2x_1}{m_1+m_2},\frac{m_1y_1+m_2y_2}{m_1+m_2}\right)$

134. The distance between the points A{4, 3} and B {8, 6} is
1) 5 2) 6 3) 4 4) 7

135. The points A(1, 5), B (2, 3) and C(-2, -1) are
1) vertices of a right -angled triangle
2) vertices of an isosceles triangle
3) collinear
4) non-collinear

136. The midpoint of A(1, 5) and B(-2, -1) is
1) $\left(\frac{1}{2},2\right)$ 2) $\left(2,\frac{1}{2}\right)$ 3) $\left(\frac{\sqrt{3}}{2}\right)$ 4) $\left(-\frac{1}{2},-2\right)$

137. If a line makes an angle 45^0 with positive x-axis, then its slope is,

1) $\frac{1}{\sqrt{2}}$ 2) $\frac{1}{2}$ 3) $\left(-\frac{1}{2},2\right)$ 4) 1

138. If (a, 2) lies in II quadrant, then (-a, -2) lies in the which quadrant

1) I 2) II 3) III 4) IV

139. The quadrilateral formed by the points A(0, -1), B(2, 1), C(0, 3) and D(-2, 1) taken in the same order is

1) rectangle
2) parallelogram
3) square 4) rhombus

140. If P(3, 4) and Q(7, 7) are two points and PR = 10, where P, Q and R are collinear, then R=

1) (10, 10) 2) (11, 11)
3) (11, 10) 4) (11, -10)

141. If (-2, 1), (1, 0) and (4, 3) are three consecutive vertices of a parallelogram, then the fourth vertex is

1) (2, 1) 2) (1, 4) 3) (0, 0) 4) (2, 2)

142. The slope of the line passing through (2, 3) and (4, 7) is

1) 2 2) $\frac{5}{6}$ 3) 4 4) 1

143. If (k, 2) lies in II quadrant then (-k, -2) lies in the quadrant

1) I 2) II 3) III 4) IV

144. The point of intersection of the lines 2x + 3y-5=0 and 3x-4y+1=0 lies in which quadrant

1) I 2) II 3) III 4) IV

145. (0, 0), (1, 0), (0, -4) are the vertices of a ____ triangle

1) equilateral 2) isosceles
3) right-angled isosceles
4) right-angled

146. If (8, 1), (k, -4), (2, -5) are collinear, then k =

1) 1 2) 2 3) 3 4) 4

147. If the slope of the line through (2, -7) and (x, 5) is 3 then x =

1) 4 2) 5 3) 6 4) 7

148. The distance between the points $(\cos\theta, \sin\theta)$ and $(-\sin\theta, \cos\theta)$ is

1) 1 2) $\sqrt{2}$ 3) 2 4) $\sqrt{3}$

149. The end points of a line are (2, 3), (4, 5). Then its slope is

1) 4 2) 3 3) 2 4) 1

150. The value of k for which the points (7, -2), (5, 1), (3, k) are collinear is

1) 4 2) 3 3) 2 4) none

151. The points A(7, 3), B(6, 1), (8, 2) and D(9, 4) taken in that order are the vertices of

1) square 2) rhombus
3) parallelogram 4) trapezium

152. The points of trisection of the line segment joining (2, -2) (-7, 4) are

1) (1, 0), (-4, 2) 2) (-1, 0), (-4, 2)
3) (-1, 0), (-4, -2) 4) (1, 0), (4, 2)

153. The points which divide the line segement joining A(-2, 2) and B(2, 8) into four equal parts are

1) $\left(-1,\frac{7}{2}\right),(0,5),\left(1,\frac{13}{2}\right)$

2) $\left(-1,\frac{7}{2}\right),(0,-5),\left(1,-\frac{13}{2}\right)$

3) $\left(1,\frac{7}{2}\right),(0,5),\left(1,\frac{13}{2}\right)$

4) $\left(1,\frac{7}{2}\right),(0,-5),\left(1,\frac{13}{2}\right)$

SELF TEST -KEY

01–3	02–3	03–2	04–2	05–4
06–3	07–4	08–1	09–3	10–3
11–2	12–2	13–2	14–4	15–4
16–4	17–1	18–4	19–2	20–2
21–2	22–3	23–3	24–4	25–4
26–1	27–3	28–1	29–2	30–4
31–2	32–1	33–3	34–1	35–4
36–2	37–4	38–3	39–4	40–2
41–4	42–2	43–2	44–2	45–1
46–4	47–4	48–3	49–4	50–4
51–2	52–2	53–1	54–2	55–3
56–4	57–2	58–1	59–4	60–2
61–2	62–4	63–3	64–1	65–3
66–2	67–2	68–2	69–3	70–3
71–4	72–2	73–4	74–4	75–2
76–2	77–2	78–1	79–1	80–1
81–3	82–4	83–2	84–1	85–2
86–4	87–4	88–3	89–3	90–2
91–2	92–3	93–2	94–3	95–2
96–2	97–2	98–2	99–3	100–[illegible]
101–4	102–1	103–2	104–4	105–[illegible]
106–2	107–3	108–4	109–2	110–[illegible]
111–1	112–4	113–1	114–4	115–[illegible]
116–3	117–4	118–4	119–1	120–[illegible]
121–4	122–1	123–4	124–3	125–[illegible]
126–4	127–3	128–4	129–1	130–[illegible]
131–3	132–2	133–3	134–1	135–[illegible]
136–3	137–4	138–4	139–3	140–[illegible]
141–2	142–1	143–4	144–1	145–[illegible]
146–3	147–3	148–2	149–4	150–[illegible]
151–3	152–2	153–1		

PUT YOUR FULL EFFORTS
DONOT WORRY ABOUT THE RESULT
THEY ARE BOUND TO COME TO YOU

PREVIOUS ECET QUESTIONS

TS-ECET-2017

01. The distance between the parallel straight 3x+4y-3=0 and 6x+8y-1=0 is

1) $\frac{1}{2}$ 2) $\frac{1}{4}$ 3) 4) $\sqrt{2}$

02. Angle between the lines $3x-5y-9=0, 4x-y+7=0$ is

1) $\theta=30^0$ 2) $\theta=45^0$ 3) $\theta=60^0$ 4) $\theta=15^0$

TS-ECET-2018

03. If n is the length of perpendicular from the point (3,-2) to the straight line L=12x-5y+6=0 and m is distance of that line L=0 from 12x-5y-7=0, then ____

1) n+m=2 2) n=m
3) n=2m 4) n=4m

04. The equation of the straight line passing through (2,3) and perpendicualr to the line 4x-3y=10 is____

1) $3x+4y+18=0$ 2) $3x+4y-18=0$
3) $3x-4y-18=0$ 4) $3x-4y+18=0$

05. L is a straight line passing through the piont P(1,2) such that p bisects the portion of the line intercepted between the coordinate axes, then the perpendicular distance of line L from the origin is________

1) $\frac{1}{\sqrt{5}}$ 2) $\frac{2}{\sqrt{5}}$ 3) $\frac{3}{\sqrt{5}}$ 4) $\frac{4}{\sqrt{5}}$

PREVIOUS ECET BITS KEY

01) 1 02) 2 03) 4 04) 2 05) 4

SPACE FOR IMPORTANT NOTES

SPACE FOR IMPORTANT NOTES

CIRCLES

SYNOPSIS

- If a point moves such that its distance from the fixed point c is always a constant r then the locus of that point is called a circle. Here c is the centre and the constant distance r is the radius of the circle.
- Diameter : The locus of mid points system of parallel chords of a curve is called as a diameter of that curve

Some important aspects of a circle :

- Angle in a semi circle is a right angle.
- The angle made by a chord of a circle at the centre of the circle is double to the angle made by the chord at any point of the circle.
- Any three points on the circle are non - collinear
- Through three non - collinear points only one circle passes through them.
- The line joining mid point of a chord and centre of the circle is perpendicualr to the chord.
- Perpendicular bisector of a chord of a circle passes through the centre of the circle.
- Two tangents can be drawn from an external point of the circle.
- Only one tangent can be drawn at a given point on the circle.
- No real tangent can be drawn from an internal point of a circle.
- A line is tangent to a circle then the length of the perpendicular from centre on to that line is radius.
- If a quadrilateral is inscribed in a circle, then the opposite angles are supplementary.
- The chord of a circle with maximum length is diamater.
- Circles with same centre are called as concentric circles.
- If (x_1, y_1) is the centre and 'r' is the radius of a circle then the equation of that circle is $(x - x_1)^2 + (y - y_1)^2 = r^2$
- If (0,0) is the centre and 'r' is the radius of a circle then the equation of that circle is $x^2 + y^2 = r^2$
- If $a = b$; $h = 0$ and $g^2 + f^2 - ac \geq 0$ then the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a circle.
- If $g^2 + f^2 - c \geq 0$ then the equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle. Its centre is $(-g, -f)$ and radius is $\sqrt{g^2 + f^2 - c}$
- The equation of the circle passing through origin and making intercepts a and b on x-and y - axes respectively is $x^2 + y^2 - ax - by = 0$. The circle passing through (0, 0), (a, 0), (0, b) is $x^2 + y^2 - ax - by = 0$.
- The equation of the circle passing through origin the points of intersection of the line $ax + by + c = 0$ with co-ordinate axes is

$$ab(x^2 + y^2) + c(bx + ay) = 0.$$

- The equation of the circle with (x_1, y_1) and (x_2, y_2) as extrimities of a diameter is $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$ Or $x^2 + y^2 - (x_1 + x_2)x - (y_1 + y_2)y + (x_1x_2 + y_1y_2) = 0.$

⇨ If the circle $x^2+y^2+2gx+2fy+c=0$ intersects the x - axis in 2 points A and B then $AB = 2\sqrt{g^2-c}$

⇨ If the circle $x^2+y^2+2gx+2fy+c=0$ intersects the y- axis in 2 points C and D then $CD = 2\sqrt{f^2-c}$.

⇨ If the circle $x^2+y^2+2gx+2fy+c=0$ touches the x-axis then $g^2=c$. If this circle touches the y - axis then $f^2=c$. If the above circle touches both the coordinate axes then $g^2=f^2=c$.

⇨ If the radius of a circle is zero then that circle is called a point circle.

⇨ Equation of the point

(x_1, y_1) is $(x-x_1)^2+(y-y_1)^2=0$.

⇨ Let C be the centre of a circle. If the circle touches the x-axis the C_y = radius. If the circle touches the y- axis the C_x = radius.

⇨ Let C be the centre and r be the radius of a circle. Let CM be the perpendicular from C to the line AB.

If CM < r then the line AB intersects the circle.

If CM = r then the line AB touches the circle.

if CM > r, then the line AB neither intersects nor touches the circle.

⇨ If the centres of two circles are same then those two circles are called concentric circles.

⇨ $x^2+y^2+2gx+2fy+c=0$ and $x^2+y^2+2gx+2fy+d=0$ are concentric circles.

⇨ If $s \equiv x^2+y^2+2gx+2fy+c=0$ is the equation of a circle and $P(x_1, y_1)$, $Q(x_2, y_2)$ are 2 points then

$s_1 \equiv xx_1+yy_1+g(x+x_1)+f(y+y_1)+c$

$s_2 \equiv xx_2+yy_2+g(x+x_2)+f(y+y_2)+c$

$s_{12} \equiv x_1x_2+y_1y_2+g(x_1+x_2)+f(y_1+y_2)+c$

$s_{11} \equiv x_1^2+y_1^2+2gx_1+2fy_1+c$

⇨ The power of the point $P(x_1, y_1)$ with respect to the circle $s = x^2+y^2+2gx+2fy+c=0$ is s_{11}. If $s_{11}<0$ then P lies inside the circle. $S_{11}>0$ then P lies out side of the circle. $S_{11}=0$ then point P lie on the circle.

⇨ The equation of the tangent to the circle $s=x^2+y^2+2gx+2fy+c=0$ is at (x_1, y_1) is $s_1=0$

⇨ If PA is a tangent from P to the circle $s=0$ then the distance between P and A is called the length of the tangent from P to the circle. (Here A is on the circle).

⇨ The length of the tangent from $P(x_1,y_1)$ to the circle $s=x^2+y^2+2gx+2fy+c=0$ is $\sqrt{s_{11}}$.

⇨ The locus of the point of intersection of 2 perpendicular tangents to the circle $x^2+y^2=a^2$ is $x^2+y^2=2a^2$

⇨ The sum of the slopes of the tangents from the point (x_1, y_1) to the circle $x^2+y^2=a^2$ is and the $\frac{2x_1y_1}{x_1^2-a^2}$. Product of the slopes of the tangents is $\frac{y_1^2-a^2}{x_1^2-a^2}$

⇨ The area of the triangle formed by the tangent to the circle $x^2+y^2=a^2$ at (x_1, y_1) and the coordinate axes is $\left|\frac{a^4}{2x_1y_1}\right|$

⇨ The locus of the point of intersection of perpendicular tangents drawn one to each to the circles $x^2+y^2=a^2$ and $x^2+y^2=b^2$ is $x^2+y^2=a^2+b^2$

⇨ If (x_1, y_1) is the centre and r is the radius of a circle then the parametric equations of the circle are $x=x_1+r\cos\theta$, $y=y_1+r\sin\theta$ and any point on the circle is $(\theta)=(x_1+r\cos\theta, y_1+r\sin\theta)$. where θ is the parametric angle of the point.

⇨ Let C be the centre and 'a' be the radius of a circle. If the line AB intersects the circle, let d be the perpendicular distance from C to the line AB. Then the length of the chord so formed is $2\sqrt{a^2-d^2}$

PRACTICE SET - I

01. The equation of the circle whose centre is (1,2) and which passes through the point (4,6) is
1) $x^2+y^2+2x-4y-20=0$
2) $x^2+y^2+2x+4y-20=0$
3) $x^2+y^2-2x-4y-20=0$
4) none of these

02. The equation of the circle concentric with the circle $x^2+y^2-8x+6y-5=0$ and passing through the point $(-2,-7)$, is
1) $x^2+y^2+8x+6y-27=0$
2) $x^2+y^2-8x+6y-27=0$
3) $x^2+y^2+8x+6y+27=0$
4) none of these

03. The equation of the circle concentric with the circle $x^2+y^2-6x+12y+15=0$ and of double its radius is
1) $x^2+y^2-6x+12y+75=0$
2) $x^2+y^2-6x-12y+75=0$
3) $x^2+y^2-6x+12y-75=0$
4) none of these

04. If the equation of a circle is $(4a-3)x^2+ay^2+6x-2y+2=0$, then its centre is
1) $(3,-1)$ 2) $(3,1)$
3) $(-3,1)$ 4) none of these

05. If $\lambda x^2+\mu y^2+(\lambda+\mu-4)xy-\lambda x-\mu y-20=0$ represents a circle, then the radius of the circle is equal to
1) $\sqrt{21}$ 2) $2\sqrt{41}$
3) $2\sqrt{42}$ 4) $\sqrt{42}/2$

06. The number of integral values of λ for which the equation $x^2+y^2+\lambda x+(1-\lambda)y+5=0$ represents a circle whose radius cannot exceed 5, is
1) 12 2) 14 3) 16 4) 18

07. The equation of the circle passing through the points (2,0),(0,4) and having the minimum radius is
1) $x^2+y^2-2x+4y=0$
2) $x^2+y^2+2x+4y=0$
3) $x^2+y^2+2x-4y=0$
4) $x^2+y^2-2x-4y=0$

08. The radius of the circle passing through the points (1, 2), (5, 2) & (5, -2) is
1) $2\sqrt{2}$ 2) $2\sqrt{5}$ 3) $3\sqrt{2}$ 4) $5\sqrt{2}$

09. If one end of the diameter of the circle $x^2+y^2-8x-14y+c=0$ is the point (-3,2), then its other end is the point :
1) (11,9) 2) (12,11) 3) 11,10 4) (11,12)

10. The radius of the circle touching the straight lines $x-2y-1=0$ and $3x-6y+7=0$ is
1) $\frac{3}{\sqrt{5}}$ 2) $\frac{\sqrt{5}}{3}$ 3) $\sqrt{5}$ 4) $\frac{1}{\sqrt{2}}$

11. The equation of a tangent to the circle $x^2+y^2=25$ passing through (-2,11) is:

1) $4x+3y=25$ 2) $7x-24y=320$

3) $3x+4y=38$ 4) $24x+7y+125=0$

12. If the lines $2x+3y+1=0$ and $3x-y-4=0$ lie along diameters of a circle of circumference 10π, then the equation of the circle is:

1) $x^2+y^2-2x+2y-23=0$

2) $x^2+y^2-2x-2y-23=0$

3) $x^2+y^2+2x+2y-23=0$

4) $x^2+y^2+2x-2y-23=0$

13. If the line $3x-2y+6=0$ meets x-axis, y-axis respectively at A and B. then the equation of the circle with radius AB and Centre at A is......

1) $x^2+y^2+4x+9=0$

2) $x^2+y^2+4x-9=0$

3) $x^2+y^2+4x+4=0$

4) $x^2+y^2+4x-4=0$

14. If p_1, p_2, p_3 are the perimeters of the three circles $x^2+y^2+8x-6y=0, 4x^2+4y^2-4x-12y-186=0$ and $x^2+y^2-6x+6y-9=0$ respectively.

1) $P_1<P_2<P_3$ 2) $P_1<P_3<P_2$

3) $P_3<P_2<P_1$ 4) $P_2<P_3<P_1$

15. If $5x-12y+10=0$ and $12y-5x+16=0$ are two tangents to a circles then radius of the circle is

1) 1 2) 2 3) 4 4) 6

16. The centre of the circle touching the y-axis at (0, 3) and making an intercept of 2 units on the positive x-axis

1) $(10,\sqrt{3})$ 2) $(\sqrt{3},10)$

3) $(\sqrt{10},3)$ 4) $(3,\sqrt{10})$

17. The equation of a circle with centre (4, 1) and having $3x+4y-1=0$ as tangent is

1) $x^2+y^2-8x-2y-8=0$

2) $x^2+y^2-8x-2y+8=0$

3) $x^2+y^2-8x+2y+8=0$

4) $x^2+y^2-8x+2y+4=0$

18. The locus of point of intersection of perpendicular tangents to the circle $x^2+y^2=a^2$

1) $x^2+y^2=2a^2$ 2) $x^2+y^2=4a^2$

3) $x^2+y^2=6a^2$ 4) $x^2+y^2=8a^2$

19. The centre and the radius of the circle with the segment of the line x + y = 1 cut off by the co-ordinate axes as a diameter

1) $(1,1)\ \sqrt{2}$ 2) $\left(\frac{1}{2},\frac{1}{2}\right), \sqrt{2}$

3) $\left(\frac{1}{2},\frac{1}{2}\right), \frac{1}{\sqrt{2}}$ 4) (0, 0), 1

20. The radius of any circle touching the lines $3x-4y+5=0$ and $6x-8y-9=0$ is

1) $\frac{19}{10}$ 2) $\frac{19}{20}$

3) $\frac{9}{20}$ 4) $\frac{90}{20}$

21. Equation of the circle passing through (0,0), (0,a) and (a,0) is

1) $x^2+y^2+ax+ay=0$

2) $x^2+y^2-ax-ay=0$

3) $x^2+y^2-ax+ay=0$

4) $x^2+y^2+ax-ay=0$

22. The length of the diameter of the circle $x^2+y^2-6x-8y=0$ is

1) 100 2) 10 3) 20 4) 5

23. The equation of the circle passing through the points $(1,2),(3,-4)$ and $(5,-6)$ is

1) $x^2+y^2+22x-4y+25=0$

2) $x^2+y^2-22x-4y+25=0$

3) $x^2+y^2-22x-4y-25=0$

4) $x^2+y^2-22x-4y-25=0$

24. Equation of the circle with centre $\left(\frac{a}{2},\frac{b}{2}\right)$ and radius $\sqrt{\frac{a^2+b^2}{4}}$ is

1) $x^2+y^2-ax-by=(a+b)^2$

2) $x^2+y^2-ax-by=0$

3) $x^2+y^2+ax+by=(a-b)^2$

4) $x^2+y^2-ax-by=\frac{a^2+b^2}{4}$

25. The equation of the circle with (0,1) and (0,2) as ends of a diameter is

1) $x^2+y^2-3y+2=0$

2) $x^2+y^2+3y+2=0$

3) $x^2+y^2-3y-2=0$

4) none of these

PRACTICE TEST- I KEY

01) 3	02) 2	03) 3	04) 3	05) 4
06) 3	07) 4	08) 1	09) 4	10) 2
11) 1	12) 1	13) 2	14) 4	15) 1
16) 3	17) 2	18) 1	19) 3	20) 2
21) 2	22) 2	23) 2	24) 2	25) 1

PRACTICE SET - II

01. Equation of the circle with centre (1,2) and passing through (2,1) is

1) $x^2+y^2-6x+10y+18=0$
2) $x^2+y^2+6x-10y+18=0$
3) $x^2+y^2-6x+10y+25=0$
4) $x^2+y^2-2x-4y+3=0$

02. Equation of the circle which touches the line x+y-8=0 and centre (3,3) is

1) $x^2+y^2-6x-6y=0$
2) $x^2+y^2-6x-6y+4=0$
3) $x^2+y^2-6x-6y+36=0$
4) $x^2+y^2-6x-6y+16=0$

03. If(-2,5) is the centre of the circle which touches y-axis, then the equation of the circle is

1) $x^2+y^2-4x-10y+25=0$
2) $x^2+y^2-4x-10y+4=0$
3) $x^2+y^2+4x+10y+2=0$
4) $x^2+y^2+4x-10y+25=0$

04. The equation of the circle whose radius is $\sqrt{13}$ and which touches the line $2x-3y+1=0$ at (1,1) is

1) $(x-3)^2+(y-2)^2=13$
2) $(x-3)^2+(y+2)^2=13$
3) $(x+4)^2+(y+2)^2=13$
4) $(x-1)^2+(y+4)^2=13$

05. If $2x-3y=5$ and $3x-4y=7$ are the equations of 2 diameters of a circle whose area is 154 sq.units, then the equation of the circle is

1) $x^2+y^2+2x-2y-47=0$
2) $x^2+y^2-2x+2y-49=0$
3) $x^2+y^2-2x+2y+47=0$
4) $x^2+y^2-2x+2y-47=0$

06. (0,0) is the centre of the circle passing through the verticies of an equilateral triangle. If the length of the median of the triangle is 9 units then equation of the circle is

1) $x^2+y^2=9$ 2) $x^2+y^2=36$
3) $x^2+y^2=3$ 4) $x^2+y^2=6$

07. Equation of the circle passing through the origin and makes intercepts 4 and 6 on positive x-axis and y-axis respectively is
1) $x^2+y^2-4x-6y=0$
2) $x^2+y^2-8x-12y=0$
3) $x^2+y^2+4x+6y=0$
4) $x^2+y^2+8x+12y=0$

08. The equation of the circles which touches the x-axis at (4,0) and radius 2 units are
1) $x^2+y^2+4x\pm 4y+4=0$
2) $x^2+y^2+8x\pm 2y+16=0$
3) $x^2+y^2-8x\pm 4y+16=0$
4) $x^2+y^2+8x\pm 4y+16=0$

09. Circle touching both the axes and the line $3x+4y=12$ is
1) $x^2+y^2+2x+2y+1=0$
2) $x^2+y^2-2x-2y+1=0$
3) $x^2+y^2-4x-4y+4=0$
4) $x^2+y^2+6x+6y+9=0$

10. The radius of circle touching y-axis at origin and touches x=6 is
1) 2   2) 3   3) 6   4) 4

11. Equation of the circumcircle of the triangle formed by the co-ordinate axes and the line 3x+4y=24 is
1) $x^2+y^2-8x-6y=0$ 2) $x^2+y^2+8x-6y=0$
3) $x^2+y^2+8x+6y=0$
4) $x^2+y^2-8x+6y=0$

12. If the centre of the circle $2x^2+pxy+qy^2+2gx+2fy+3=0$ is (1,-3) then the radius of the circle is
1) 17/2   2) $2\sqrt{7}$ 3) 17   4) $\sqrt{17/2}$

13. If the line x+y=1 intersects the co-ordinate axes at A and B then the centre and radius of the circle whose diameter is AB are
1) $(1,1);\sqrt{2}$ 2) $\left(\frac{1}{2},\frac{1}{2}\right),\sqrt{2}$
3) $\left(\frac{1}{2},\frac{1}{2}\right);\frac{1}{\sqrt{2}}$ 4) (0,0) ; 1

14. The line $x+y=2\sqrt{2}$ touches the circle $x^2+y^2=4$ at
1) $(\sqrt{2},\sqrt{2})$ 2) $(\sqrt{2},-\sqrt{2})$
3) $(3\sqrt{2},-\sqrt{2})$ 4) $(4\sqrt{2},-2\sqrt{2})$

15. The x- coordinates of the points A and B are the roots of the equation $x^2-5x+6=0$ and y-coordinates of A, B are roots of the equation $y^2-2y-3=0$. The radius of the circle on AB as diameter is
1) $\frac{\sqrt{29}}{2}$ 2) $\frac{\sqrt{17}}{4}$ 3) $\frac{\sqrt{17}}{2}$ 4) $\sqrt{17}$

16. If A=(0,1), B=(α,β) and the circle on AB as diameter intersects x-axis in 2 points whose x-coordinates are the roots of the equation $x^2-5x+3=0$, then (α,β)
1) (5,3)   2) (3,3)
3) (-5,3)   4) (3,-5)

17. Equation of the circle passing through the origin and makes intercepts 4 and 6 on negative x-axis & negative y-axis respectively is
1) $x^2+y^2-4x-6y=0$
2) $x^2+y^2-8x-12y=0$
3) $x^2+y^2+4x+6y=0$
4) $x^2+y^2+8x+12y=0$

18. The equation of a circle which passes through (1,2) and (2,1) and whose radius is 1 units is
1) $x^2+y^2-4x-4y+7=0$
2) $x^2+y^2-2x-4y+4=0$
3) $x^2+y^2-4x-2y+4=0$
4) $x^2+y^2-x-y+1=0$

19. The equation of the circle concentric with $x^2+y^2+8x+12y+15=0$ and having y-intercept 8 units is
1) $x^2+y^2+8x+12y-16=0$
2) $x^2+y^2+8x+12y-28=0$
3) $x^2+y^2+8x+12y+20=0$
4) $x^2+y^2+8x+12y-20=0$

20. Equation of the circle concentric with $x^2+y^2-8x-16y+4=0$ and touches y- axis is
1) $x^2+y^2-8x-16y+16=0$
2) $x^2+y^2-8x-16y+32=0$
3) $x^2+y^2-8x-16y+64=0$
4) $2x^2+2y^2=5$

21. If (-3,2) lies on the circle $x^2+y^2+2gx+2fy+c=0$ which is concentric with the circle $x^2+y^2+6x+8y-5=0$, then c =
1) 11   2) -11   3) 24   4) -24

22. The centre and radius of the circle represented by the equation $x=4+5\cos\theta$ and $y=2+5\sin\theta$ are
1) (-4, -2), 5   2) (2, 4),5
3) (4, 2), 5   4) (-2, -4), 5

23. If the length of the intercept made by the circle $x^2+y^2+4x-6y+c=0$ on the line $x-3y+1=0$ is $2\sqrt{6}$ then c =
1) -3   2) 3   3) -21   4) 21

24. The area of the circle $2x^2+2y^2-4x+6y-3=0$ is
1) $\frac{19\pi}{2}$ 2) $\frac{209}{41}$
3) $\frac{209}{14}$ 4) $\frac{19}{4}$B

25. The equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a circle if
1) ab = h^2
2) a = b, h= 0, $g^2+f^2 \geq ac$
3) a = b, $g^2=f^2$
4) a = b, h = 0, $g^2+f^2 \leq ac$

26. The center of the circle $(x\cos\alpha+y\sin\alpha-a)^2+(x\sin\alpha-y\cos\alpha-b)^2=k^2$ (if α varies) is
1) $(a\cos\alpha+b\sin\alpha, a\sin\alpha+b\cos\alpha)$
2) $(a\cos\alpha-b\sin\alpha, a\sin\alpha+b\cos\alpha)$
3) $(a\cos\alpha+b\sin\alpha, a\sin\alpha-b\cos\alpha)$
4) $(a\cos\alpha-b\sin\alpha, a\sin\alpha-b\cos\alpha)$

27. If a circle has $x+3y-4=0$, $7x-y-6=0$ as two diameters then its centre is
1) (0,0)   2) (-2,2)   3) (-5,3)   4) (1,1)

28. If the area of the circle $x^2+y^2-4x-2y+k=0$ is 25π square cms then K=
1) -20   2) 20   3) ±20   4) 0

29. The circle concentric with $x^2+y^2+4x+6y+3=0$ and radius 2 is
1) $x^2+y^2+4x+6y-9=0$
2) $x^2+y^2+4x+6y+9=0$
3) $x^2+y^2-4x-6y+9=0$ 4) $x^2+y^2=4$

30. The number of tangents that can be drawn from (2,3) to the circle $x^2+y^2=5$ is
1) 0   2) 1   3) 2   4) infinity

PRACTICE SET - II KEY

01) 4	02) 4	03) 4	04) 2	05) 4
06) 2	07) 1	08) 3	09) 2	10) 2
11) 1	12) 4	13) 3	14) 1	15) 3
16) 1	17) 3	18) 1	19) 3	20) 3
21) 2	22) 3	23) 1	24) 4	25) 2
26) 3	27) 4	28) 1	29) 2	30) 3

SELF TEST

01. The equation of the circle with centre $(3,-2)$ and radius 3 is
1) $x^2+y^2-6x+4y+4=0$
2) $x^2+y^2-4x+6y+9=0$
3) $x^2+y^2+14x+6y-42=0$
4) $x^2+y^2+2x+16y+40=0$

02. The equation of the circle with centre origin and radius 2 is
1) $x^2+y^2-6x+4y+4=0$ 2) $x^2+y^2=4$
3) $x^2+y^2-4x+6y-12=0$
4) $x^2+y^2+2x+16y+40=0$

03. The centre of the circle $x^2+y^2-4x-2y-4=0$ is
1) $(2,1)$ 2) $(0,0)$ 3) $(-2,-1)$ 4) $(1,-1)$

04. The centre of the circle $2x^2+2y^2-4x+6y-3=0$
1) $(-3,-4)$ 2) $(1,-3/2)$
3) $(1,2)$ 4) $(2,-1)$

05. The radius of the circle $x^2+y^2+6x+8y-96=0$ is
1) 11 2) $\sqrt{19}/2$ 3) $4/\sqrt{3}$ 4) 20

06. The length of the diameter of the circle $x^2+y^2-6x-8y=0$ is
1) 5 2) 10 3) 15 4) 20

07. The equation of the circle passing through $(-7,1)$ and having centre at $(-4,-3)$ is
1) $x^2+y^2+8x+6y=0$
2) $x^2+y^2+4x-16y-101=0$
3) $x^2+y^2-4x-6y=0$
4) $x^2+y^2=5$

08. If $2x^2+by^2+4x-6y-1=0$ represents a circle, then b =
1) 2 2) 3 3) 1 4) 0

09. If $x^2+y^2-4x+6y+c=0$ represents a circle of radius 5 then c =
1) -2 2) -12 3) -3 4) 1

10. The point $(-1,0)$ lies on the circle $x^2+y^2-4x+8y+k=0$. The radius of the circle is
1) 4 2) 5 3) 3 4) none

11. For the circle $x^2+y^2-4x-2y-36=0$, the point $(3,5)$
1) lies inside the circle 2) lies outside the circle
3) lies on the circle
4) is the centre of the circle

12. The equation $x^2+y^2+4x+6y+13=0$ represents
1) a circle
2) a pair of two straight lines
3) a pair of coincident straight lines 4) coincident

13. If the two circles $x^2+y^2+2gx+c=0$ and $x^2+y^2-2fy-c=0$ have equal radius then locus of (g,f) is
1) $x^2+y^2=c^2$ 2) $x^2-y^2=2c$
3) $x-y^2=c^2$ 4) none

14. The equation of the circle through $(1,0)$ and $(0,1)$ and having smallest possible radius is
1) $x^2+y^2-x-y=0$
2) $2x^2+2y^2-x-y=0$
3) $x^2+y^2+x+y=0$ 4) none

15. If one end of the diameter of the circle $x^2+y^2-6x+4y-12=0$ is $(7,-5)$, then the other end of the diameter is
1) $(-1,-3)$ 2) $(-1,1)$
3) $(-4,3)$ 4) $(-4,4)$

16. If $(x,3)$ and $(3,5)$ are the ends of the diameter of a circle with centre at $(2,y)$, then the values of x and y are
1) $x=1, y=4$ 2) $x=4, y=1$
3) $x=8, y=2$ 4) none

17. The equation of the circle passing through origin and concentric with $x^2+y^2+8x+12y+15=0$ is
1) $x^2+y^2+2x+3y=0$
2) $x^2+y^2+8x+12y=0$
3) $x^2+y^2-x-y=0$
4) $x^2+y^2-ax-by=0$

18. The equation of the circle concentric with $x^2+y^2-6x+4y-3=0$ and having radius 5 is
1) $x^2+y^2-6x+4y-12=0$
2) $x^2+y^2-2x+8y-33=0$
3) $x^2+y^2-6x-4y-12=0$
4) $x^2+y^2+x+8y+33=0$

19. The equation of the circle passing through the pints $(1,1),(2,-1),(3,2)$ is
1) $x^2+y^2+2x+3y=0$
2) $x^2+y^2-5x-y+4=0$
3) $x^2+y^2-x-y=0$
4) $x^2+y^2-ax-by=0$

20. The equation of the circle whose radius is 5 and which passes through the points on x-axis at distance 3 from the origin is
1) $x^2+y^2+8y-9=0$
2) $x^2+y^2+8y+9=0$
3) $x^2+y^2-8y+9=0$
4) $x^2+y^2+8x-9=0$

21. The equation of the tangent at $(1,1)$ to the circle $2x^2+2y^2-2x-5y+3=0$ is
1) $2x+y-1=0$ 2) $2x-y-1=0$
3) $x+2y-1=0$ 4) $2x+y+1=0$

22. If $x^2+y^2-4x+6y+k=0$ touches x-axis then k =
1) ±20 2) -1,-5 3) ±2 4) 4

23. If $x^2+y^2+6x+2ky+25=0$ to touch y-axis then k =
1) ±20 2) -1,-5 3) ±5 4) 4

24. The equation of the circle passing through $(2,1)$ and touching the coordinate axes is
1) $x^2+y^2-2x-2y+1=0$
2) $x^2+y^2+2x+2y+1=0$
3) $x^2+y^2-2x-2y-1=0$
4) $x^2+y^2+2x+2y-1=0$

25. The equation of the circle touching the coordinate axes and the line $x+2=0$ is
1) $b(x^2+y^2)=x(b^2-c^2)$
2) $b(x^2+y^2)=y(b^2+c^2)$
3) $b(x^2+y^2)=x(b^2+c^2)$
4) $b(x^2+y^2)=y(b^2-c^2)$

SELF TEST KEY

01) 1	02) 2	03) 1	04) 2	05) 1
06) 2	07) 1	08) 1	09) 2	10) 2
11) 1	12) 4	13) 2	14) 1	15) 2
16) 1	17) 2	18) 1	19) 2	20) 1
21) 2	22) 4	23) 3	24) 1	25) 3

PREVIOUS ECET BITS

2008

01. The equation of the circle with radius 3 and centre $(3,-2)$ is
1) $x^2+y^2-6x+4y+4=0$
2) $x^2+y^2+6x+4y+5=0$
3) $x^2+y^2+6x-4y-4=0$
4) $x^2+y^2+6x+4y+10=0$

02. The equation of the circle having $(3,4)$ and $(-7,2)$ as extremities of diameter is
1) $x^2+y^2+4x-6y-13=0$
2) $x^2+y^2-4x+6y+13=0$
3) $x^2+y^2+4x+6y+13=0$
4) $x^2+y^2+4x+6y-13=0$

2009

03. Find the equation which passes through $(-7,1)$ and has centre $(-4,3)$
1) $x^2+y^2+8x+6y+25=0$
2) $x^2+y^2+8x+6y=0$
3) $x^2+y^2-8x+6y-5=0$
4) $x^2+y^2-8x-6y=0$

04. The equation of the circle passing through the point $(1,-2)$ and concentric with $x^2+y^2+8x+12y+15=0$ is
1) $x^2+y^2-8x-12y-15=0$
2) $x^2+y^2-8x+12y-15=0$
3) $x^2+y^2+8x+12y+11=0$
4) $x^2+y^2-8x-8y-11=0$

2010

05. The equation of the circle passing through $(0,0),(0,a),(a,0)$ is
1) $x^2+y^2+ax+ay=0$ 2) $x^2+y^2-ax-ay=0$
3) $x^2+y^2+2ax+2ay=0$
4) $x^2+y^2-2ax-2ay=0$

06. The equation of the tangent at $(1,1)$ to the circle $2x^2+2y^2-2x-5y+3=0$ is
1) $2x+y-1=0$ 2) $2x-y-1=0$
3) $x+2y-1=0$ 4) $2x+y+1=0$

2011

07. The equation of the circle passing through the origin $x^2+y^2-6x-2y=0$. The equation of one of its diameters is
1) $x+3y=0$ 2) $x+y=0$
3) $x=y$ 4) $3x+y=0$

08. If $(x,3)$ and $(3,5)$ are the extremities of a circle with center at $(2,y)$, then the value of x and y is
1) $x=1, y=4$ 2) $x=4, y=1$
3) $x=8, y=2$ 4) $x=0, y=5$

2012

09. If one end of the diameter of the circle $x^2+y^2-5x-8y+13=0$ is (2,7), then the other end of the diameter is
1) (3,1) 2) (1,3) 3) (-3,-1) 4) (-1,-3)

10. The radius of the circle $\sqrt{1+m^2}\left(x^2+y^2\right)-2cx-2mcy=0$ is
1) $2c$ 2) $4c$ 3) $c/2$ 4) c

2013

11. If (3, -1) is the coordinates of one end of the diameter of the circle $x^2+y^2-2x+4y=0$, the coordinates of the other end is
1) (-3, 1) 2) (-1, 3) 3) (-1, -3) 4) (1, 3)

12. If the radius of the circle $x^2+y^2-8x+10y+k=0$ is 7, then k =
1) 49 2) -1 3) -8 4) 4

13. The length of x-intercept made by the circle $x^2+y^2+4x-7y-12=0$ is
1) 6 units 2) 12 units
3) 4 units 4) 8 units

2014

14. The most general second degree equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a circle of
1) $a+b=0, h=0$ 2) $a-b=0, h=0$
3) $a-b=0, h\neq 0$ 4) $a+b\neq 0, h\neq 0$

15. The equation of the circle whose radius is $\sqrt{(a^2-b^2)}$ and whose center is $(-a,-b)$ is
1) $x^2+y^2+2ax+2by+2a^2=0$
2) $x^2+y^2-2ax+2(a^2+b^2)=0$
3) $x^2+y^2+2ax+2by+2(a^2-b^2)=0$
4) $x^2+y^2+2ax+2bx+2b^2=0$

A.P ECET-2015

16. If 3x+4y+k=0 touches the circle $x^2+y^2=16$, then the value of k is
1) ±10 2) ±20 3) ±5 4) ±15

17. The point (-1, 0) lies on the circle $x^2+y^2-4x+8y+k=0$. the radius of the circle is
1) 4 2) 5 3) 3 4) 2

T.S ECET- 2015

18. If y=x+c is a tangent to the circle $x^2+y^2=8$, then c is equal to
1) 4 2) ±4 3) 8 4) ±8

A.P ECET-2016

19. The intercept on x-axis made by the circle $3x^2+3y^2-6x+13y+5=0$ is
1) 4 2) 3 3) 6 4) 2

20. The length of the diameter of the circle $x^2+y^2-6x-8y=0$ is
1) 10 2) 15 3) 5 4) 20

T.S ECET- 2016

21. The angle between the tangents from the point (4, 2) to the circle $x^2+y^2=10$ is
1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{2}$ 4) $\frac{2\pi}{3}$

A.P ECET-2017

22. If the line y = 2x+c is a tangent to $x^2+y^2=5$ then the value of c is
1) 2 2) 3 3) 4 4) 5

23. The length of the diameter of the circle $x^2+y^2-6x-8y=0$ is
1) 10 2) 15 3) 5 4) 20

T.S ECET- 2017

24. The distance between the parallel straight 3x+4y-3=0 and 6x+8y-1=0 is
1) $\frac{1}{2}$ 2) $\frac{1}{4}$ 3) 4) $\sqrt{2}$

25. Angle between the lines $3x-5y-9=0; 4x-y+7=0$ is
1) $\theta=30^0$ 2) $\theta=45^0$
3) $\theta=60^0$ 4) $\theta=15^0$

26. Equation of the circle passing through (3, -4) and concentric with $x^2+y^2+4x-2y+1=0$ is
1) $x^2+y^2+4x-2y-15=0$
2) $x^2+y^2+4x-2y-30=0$
3) $x^2+y^2+x-2y-45=0$
4) $x^2+y^2+4x-2y-45=0$

A.P ECET-2018

27. The radius of the circel $5x^2+5y^2-6x+8y-75=0$ is
1) -4 2) 4 3) 2 4) 3

28. The angle between the curves $y=x^2+3x-7$ and $y^2=2x+5$ at (2,3) is
1) $\tan\theta=2$ 2) $\sec\theta=2$

3) $\cos\theta = 1$ 4) $\sin\theta = 3$

29. The centre of the cirles $x^2+y^2-2x+6y-6=0$

1) (1,3) 2) (2,3) 3) (1,-3) 4) (-1,3)

PREVIOUS ECET BITS KEY

01) 1	02) 1	03) None	04) 3	05) 2
06) 2	07) 1	08) 1	09) 1	10) 4
11) 3	12) 4	13) 1	14) 2	15) 4
16) 2	17) 2	18) 2	19) *	20) 1
21) 3	22) 4	23) 1	24) 1	25) 2
26) 4	27) 2	28) 1	29) 3	

THERE IS NO SUBSTITUTE TO HARDWORK

SPACE FOR IMPORTANT NOTES