Chapter Number 1
Matrices And Determinants

1-Define matrix and give an example.
A rectangular array of real numbers enclosed by brackets is called matrix.

Example: $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

2-Differentiate between columns and rows of a matrix.
The entries presented in horizontal way are called rows, while entries presented in vertical way are called columns of a matrix.

3-Define order of a matrix.
If a matrix M has m rows and n columns then matrix will have order m-by-n.

Example: $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ has order 2-by-2.

4-What is meant by equal matrices?
Two matrices A and B will be equal if,

- Order (A)=Order(B)
- Corresponding entries of A = Corresponding entries of B

5-Define Row matrix and give an example.
A matrix M is called row matrix if it has only one row.

Example: $\begin{bmatrix} 1 & 2 \end{bmatrix}$

6-Define column matrix and give an example.
A matrix M is called column matrix it has only one column.

Example: $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$

7-Define rectangular matrix and give an example.
A matrix is called rectangular matrix, if the number of rows is not equal to its number of columns.

Example: $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

8-Define square matrix and give an example.
A matrix is called square matrix, if the number of rows is equal to its number of columns.

Example: $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

9-Define null matrix and give an example.
A matrix is called null or zero matrix, if each of its entries is 0.

Example: $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

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10-Define transpose of a matrix and give an example.
A matrix obtained by changing the rows into columns or columns into rows of a matrix is called transpose of that matrix. Transpose of matrix A is denoted by A^t.

Example: $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $A^t = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$

11-Define negative of a matrix and give an example.
Negative of a matrix A is obtained by changing the signs of all the entries of A.

Example: $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $-A = \begin{bmatrix} -1 & -3 \\ -2 & -4 \end{bmatrix}$

12-What is symmetric matrix and also give an example.
A square matrix A is symmetric if
$A=A^t$

Example: $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ and $A^t = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix} = A$

13-What is skew symmetric matrix and give an example.
A square matrix A is symmetric if
$A = -A^t$

Example: $A = \begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix}$ and $A^t = \begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix} = -A$

14-Define diagonal matrix and give an example.
A square matrix A is called a diagonal matrix if at least any one of the entries of its diagonal is not zero and non-diagonal entries are zero.

Example: $A = \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix}$

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15-Define scalar matrix and give an example.
A diagonal matrix is called a scalar matrix, if all the diagonal entries are same and non-zero.

Example: $A=\begin{bmatrix}2 & 0\\ 0 & 2\end{bmatrix}$

16-Define identity matrix and give an example.
A diagonal matrix is called identity matrix if all the diagonal entries are 1. It is denoted by I.

Example: $A=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

17-Defne determinant of a matrix.
Let $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}$ be a square matrix then its determinant is denoted by $|A|$ and

$$|A|=\begin{vmatrix}a & b\\ c & d\end{vmatrix}=ad-bc$$

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18-Define singular matrix.
A square matrix is singular if its determinant is equal to zero i.e. $|A|=0$

19-Define non-singular matrix.
A square matrix is non-singular if its determinant is not equal to zero i.e. $|A|\neq 0$

Example: $|A|=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}=1$

23-Define Adjoint of a matrix.
Adjoint of a square matrix is obtained by interchanging the diagonal entries and changing the sign of other entries.

Example: If $A=\begin{bmatrix}1 & 2\\ 2 & 4\end{bmatrix}$ then $adj(A)=\begin{bmatrix}4 & -2\\ -2 & 1\end{bmatrix}$

Chapter Number 2
Real and Complex Numbers

1-Define rational numbers.
Those numbers which can be written in the form of $\frac{p}{q}$ and p, q are integers and $q\neq 0$.

2-Define irrational number.
Those numbers which cannot be written in the form of $\frac{p}{q}$ and p, q are integers and $q\neq 0$.

3-Define real numbers.
Union of rational numbers and irrational numbers is real numbers.

4-Define complex number and give an example.
The number which can be written in the form of $z=a+bi$ is called complex number and $\sqrt{-1}=i$.
Example: $z=2+3i$

5-What is conjugate of a complex number.
The complex number which is obtained by changing sign of imaginary part of a complex number is called its conjugate.
Example: if $z=2+3i$ then $\bar{z}=2-3i$

Chapter Number 3
Logarithm

1-Define Scientific Notation.
In Scientific notation a number is expressed as some power of ten multiplied by a number between 1 and 10.

2-Define logarithm of a real number.
If $a^x=y$ then x is called the logarithm of y to the base of a and written as, $\log_a y=x$.

3-Define common logarithm.
The logarithm having base 10 is called common logarithm.

4-Define natural logarithm.
The logarithm having base e is called natural logarithm.

5-Differentitate between characteristic and mantissa.
An integral part which is positive for a number greater than 1 and negative for a number less than 1, is called the characteristic.

A decimal part which is always positive is called mantissa.

Chapter Number 4

Algebraic Expression And Algebraic Formulas

1-Define algebraic expression.
An expression obtained by combining constant terms and one or more variables using arithmetic operations is called algebraic expression.

Example: $x+4$

2-Defien polynomial.
An algebraic expression which contains one or more terms but variable should have exponent zero or some positive integer is called polynomial.

Example: $x+4$

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3-Define rational expression.

The quotient $\frac{p(x)}{q(x)}$ of two polynomials is called rational expression and $q(x) \neq 0$.

4-Define Surd.
An irrational radical with rational radicand is called a surd.
Example: $\sqrt{3}, \sqrt[3]{2}$

5-Define monomial surd.
A surd which contains a single term is called a monomial surd.
Example: $\sqrt{2}$

6-Define binomial Surd.
A surd having sum of two monomial surds or sum of a monomial surd and a rational number is called a binomial surd.
Example: $\sqrt{2}+\sqrt{3}$, or $\sqrt{2}+5$

Chapter Number 5
Factorization

1-Define factor of a polynomial.
If a polynomial is expressed as a product of other polynomials, then each polynomial in the product is called a factor of the polynomial.

2-What is factorization.
The process of expressing an algebraic expression in terms of its factors is called factorization.

3-State remainder theorem.
If a polynomial $p(x)$ is divided by a linear divisor $(x-a)$, then the remainder is $p(a)$.

4-State factor theorem.
The polynomial $(x-a)$ is a factor of the polynomial $p(x)$ if and only if $p(a)=0$.

5-What is zero of a polynomial.
If a specific number $x=a$ is substituted in a polynomial $p(x)$ and we get zero as a result, then a is called a zero of the polynomial $p(x)$.

Chapter Number 6
Algebraic Manipulation

1-Define Highest Common Factor (H.C.F.).
If two or more algebraic expression are given, then their common factor of highest power is called the H.C.F. of the expressions.

2-Define Least Common Multiple (L.C.M.).
The least common multiple (L.C.M.) is the product of common factors together with non-common factors of the given expressions.

Chapter Number 7
Linear Equations and Inequalities

1-Define Equation.
An algebraic expression contains sign of = is called equation.
Example: $4+x=3$

2-Define linear Equation.
A linear equation in one unknown variable x of the form $ax+b=0$.
Example: $2x+3=0$

3-Define inequality.
An algebraic expression which contains signs of $<, >, \leq, \geq$ is called inequality.
Example: $4+x<3$

4-Define radical Equation.
An equation in which the variable occurs under the radical is called radical equation.
Example: $\sqrt{4+x}=3$

Chapter Number 8
Linear Graphs & Their Application

1-Define ordered pair.
An ordered pair of real numbers (x, y) in which elements are written in specific order.

2-Define Cartesian plane.
The plane formed by two straight lines perpendicular to each other is called Cartesian plane and the lines are called coordinate axes.

3-Define collinear points.
Two or more than two points lie on the same line are called collinear points.

4-Differentiate between abscissa and ordinate.
The x-coordinate of a point is abscissa while y-coordinate is ordinate.

5-Define origin in Cartesian plane.
The point of intersection of two coordinate axes is called origin.

Chapter Number 9
Introduction To Coordinate Geometry

1-Define coordinate Geometry.
Coordinate geometry is the study of geometrical shapes in the Cartesian plane.

2-Define non-collinear points.
Two or more than two points which don't lie on the same line are called non-collinear points.

3-Write distance formula between any two points.
If two points are (x_1, y_1) and (x_2, y_2)
$$d = \sqrt{|x_2 - x_1|^2 + |y_2 - y_1|^2}$$

4-Write midpoint formula for any two points.
If two points are (x_1, y_1) and (x_2, y_2)
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

5-Define equilateral triangle.
The triangle having all sides are equal is called equilateral triangle.

6-Define isosceles triangle.
The triangle in which two sides are equal and third side is different is called isosceles triangle.

7-Define right angle triangle.
The triangle in which one of the interior angle is 90^o is called right angle triangle.

8-Defien Scalene Triangle.
The triangle having all sides are different is called scalene triangle.

9-Define Square in Cartesian plane.
A four sided closed figure is called square if,
- All sides are equal
- Each angle is 90

10-Define rectangle Cartesian plane.
A four sided closed figure is called rectangle if,
- Opposite sides are equal
- Each angle is 90

11-Define parallelogram.
A four sided closed figure is called parallelogram if,
- Opposite sides are congruent
- Opposite angles are congruent
- The diagonals bisect each other

12-Define Supplementary Angles.
Those angles whose sum is equal to 180^o are called supplementary angles.

Chapter Number 10
Congruent Triangles

1-Define congruent triangles or congruency of triangles.
Two triangles are congruent if their corresponding angles and sides are congruent and this also called congruency of triangles.

2-What is A.S.A. postulate.
If two corresponding angles and one side of two triangles are congruent then triangles will be congruent. This is A.S.A. Postulate.

3-What is S.S.S postulate.
If three corresponding sides of two triangles are congruent then triangles will be congruent. This is S.S.S. Postulate.

4-What is H.S postulate.

If two corresponding sides of two right angle triangles are congruent then triangle will be congruent. This is H.S. Postulate.

Chapter Number 12
Linear Bisectors and Angles Bisectors

1-Define right bisector of a line segment.
A line is called a right bisector of a line segment if it is perpendicular to the line segment and passes through its mid-point

2-Define bisector of an angle.
A ray is called a bisector of angle if it divides the angle into two equal parts.

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Chapter Number 14
Ratio and Proportion

1-Define ratio.
The ratio is the comparison or relationship between two quantities.
Example: 2:3

2-Define Proportion.
Equality of two ratios is called proportion i.e.
$a:b=c:d$

3-Define Similar Triangles.
Two triangles are said to be similar if they are equiangular and corresponding sides are proportional.

Chapter Number 15
Pythagorean's Theorem

1-Define Pythagoras theorem.
In a right angled triangle, the square of the length of hypotenuse is equal to the sum of the squares of the lengths of the other two sides.

2-Define converse of Pythagoras theorem.
If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right angled triangle.

3-Write formula for Pythagoras theorem.
In a right angle triangle,
$(hypotenuse)^2=(base)^2+(altitude)^2$

Chapter Number 16
Theorems Related with Area

1-Define area of figure.
The region enclosed by the bounding lines of a closed figure is called the area of the figure.

2-Define interior of a triangle.
The interior of a triangle is the part of the plane enclosed by the triangle.

3-Defne Triangular region or Area.
A triangular region is the union of a triangle and its interior and it is also known as triangular area.

4-Define interior of a rectangle.
The interior of a rectangle is the part of the plane enclosed by the rectangle.

5-Define Rectangular region or Area.
A rectangular region is the union of a rectangle and its interior and it is also called Rectangular Area.

6-Define altitude or height of a triangle.
The altitude is a perpendicular that is drawn from vertex of a triangle to the opposite side.

Chapter Number 17
Practical Geometry

1-Define Concurrent Lines.
If two or more than two lines pass through a single point such lines are called concurrent lines and point is called point of concurrency.

2-Define incenter of a triangle.
The point of concurrency of three internal bisectors of the angles of a triangle is called incenter of the triangle.

3-Define circumcentre of a triangle.
The point of concurrency of the three perpendicular bisectors of the sides of a triangle is called the circumcentre of the triangle.

4-Deine orthocenter of a triangle.

The point of concurrency of the three altitudes of a triangle is called its orthocenter.

5-Define centroid of a triangle.

The point of concurrency of the three medians of a triangle is called the centroid of the triangle.

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