IERT EXAM SYLLABUS [MATHS]

MATHEMATICS

A. ARITHMETIC:

1. Simple & Compound interest.
2. Work-time and speed-time.
3. Bank deposits and payments in installments, Taxation.
4. Percentage, Profit, Loss & Discount.
5. Ratio, Proportion & Mixture.

B. STATISTICS:

1. Importance of statistics and its usefulness.
2. Classification of data frequency distribution, cumulative frequency. Graphical representation of statistical data, bar chart, histogram, frequency polygon, frequency curves, cumulative frequency curve and graphical representation, Pie diagram.
3. Measures of Central Tendency- Mean, Median & Mode.
4. Measures of Dispersion – Range, Mean Deviation, Standard Deviation & Variance.

C. ALGEBRA:

1. Number System-Natural Numbers, Whole Numbers, Integers, Even Numbers, Odd Numbers, Rational Numbers, Irrational Numbers, Real Numbers, Prime Numbers, Twin Prime Numbers, Composite Numbers and their characteristics.
2. Laws of Indices, Surds & Simplification.
3. Square Roots & Cube Roots.
4. Logarithms-definition, laws and their application, to find the characteristics & mantissa.
5. Factors-expressions in the form of difference of two squares, trinomial expression, factorization by completing the square, expressions in the form of sum and difference of two cubes, reminder theorem and expression of the type $a^3+b^3+c^3-3abc$.
6. L.C.M. & H.C.M by factorization.
7. Linear & Quadratic Equations.
8. Solution of simultaneous equations (linear equations with three variables) and problems based on them.
9. Set Theory – Sets, Representation of Sets, Types of Sets, Subsets, Universal set, Complement of Set, Union of Sets, Interaction of Sets, Disjoint Set, Difference of Sets, Laws of Algebra of Sets & Simple Problems with the help of Venn diagram.
10. Mappings - Into Mapping, Onto Mapping, One-One Mapping and Many-One Mapping.

D. TRIGONOMETRY:

1. Circular measures (relation between radian & degree), definition of trigonometric ratios and their relations.
2. Trigonometrical ratios of angles of 0^0, 30^0, 40^0, 60^0, 90^0 and 180^0
3. Trigonometrical ratios of angles of $90\pm\theta$, $180\pm\theta$, $270\pm\theta$, $360\pm\theta$, where θ is any angle.
4. Trigonometrical ratios (sine, cosine, tangent and cotangent) for the sum & difference of two angles.
5. Expressing products of sines and cosines into sum and difference form.
6. Trigonometrical ratios of multiple & sub multiple angles.
7. Angle of elevation and depression. Simple problems on height & distance.

E. GEOMETRY:

1. Pythagoras Theorem and its extension: Problems based on-

a. The square on one side of a triangle is greater, equal or smaller than the sum of the squares on two sides of it, according as the angle between these two sides is an obtuse angle, a right angle or an acute angle. In case of an un-equality the difference is twice the rectangle contained by one of these sides and projection of the other on this side. Knowledge of the Pythagoras number (3, 4, 5), (5, 12, 13) etc.

b. Apollonius Theorem- The sum of the squares contained on the two sides of a triangle equals twice the sum of the squares contained on half of the third side and the median bisecting this side.

2. Circles: Problems based on-

a. The line joining the center a circle to the midpoint of a chord is at right angles to it.
b. The converse of the above theorem.
c. One and only one circle can pass through three points not on the same straight line.
d. Segments subtending equal angles at the centers of equal circles are also equal.
e. The converse of the above theorem.
f. Equal chords of equal circles are contained on equal area.
g. The converse of the above theorem.
h. In a circle equal chords are equidistant from the center.
i. The converse of the above theorem.
j. The angle subtended at the center of a circle by an area is as twice the angle subtended by it at the remaining circumference.
k. Angles on the same segment of a circle are equal.
l. If the angles subtended by a straight line formed by joining two points at two other points (in the same side) are equal, the four points are

j. The angle subtended at the center of a circle by an area is as twice the angle subtended by it at the remaining circumference.
k. Angles on the same segment of a circle are equal.
l. If the angles subtended by a straight line formed by joining two points at two other points (in the same side) are equal, the four points are noncyclic.
m. Angle on the semicircle is a right angle, that on the major segment is acute and the one on the minor segment is obtuse.

3. Area and Perimeter of Plane Figures.

F. MENSURATION (Solid Geometry):

Surfaces & Volumes of Cube, Cuboids, Rectangular Parallelepiped, Right Prism, Right Pyramid, Right Circular Cylinder, Right Circular Cone and Sphere (application of the formulae without proof).

G. COORDINATES GEOMETRY:

Distance Between Two Points, Section Formulae, Coordinates of Centroid, Circumcenter, Incentre & Orthocenter of a Triangle, Area of a Triangle & Quadrilateral, Collinear Points, Equations of Straight Lines in Different Forms, Length of a Perpendicular, Distance Between Two Parallel Lines, Equations of Parallel & Perpendicular Lines, Coordinates of the Foot of Perpendicular, Angles Between Two Lines, Co-ordinates of a Point of Intersection, Equations of the Bisectors of the Angles Between Two Given Lines, Concurrent Lines.