



## MATH DEPARTMENT

Year of 2026-2027

### Lessons required for the Math Entrance Exam: (Grade 11L to 12 SE)

*\*Calculator is needed.*

#### 1. Quadratic Equations

Students should be able to:

- Solve complete and incomplete quadratic equations by using quadratic formula.
- Find two real numbers whose sum S and product P are given ( $x^2 - Sx + P = 0$ ).

#### 2. Quadratic Inequalities

Students should be able to:

- Study the sign of a quadratic function.
- Solve quadratic inequalities with one unknown.

#### 3. Polynomials

Students should be able to:

- Factorize a second-degree polynomial.
- Factorize a third-degree polynomial knowing a root (using identification method and long division).

#### 4. Limits

Students should be able to:

- Evaluate limits of functions (including indeterminate forms) as  $x$  approaches infinity and a finite real value.
- Identify and determine vertical and horizontal asymptotes to the representative curves of functions using limits.
- Study the continuity of a function at a certain point.

#### 5. Derivatives

Students should be able to:

- Find the derivative of a function using differentiation rules.
- Study the variations of a function by studying the sign of its derivative.

## **6. Study of Polynomial and Rational Functions**

Students should be able to:

- Evaluate limits at the open boundaries of the domain of definition of a polynomial/rational function.
- Study the Sense of Variations of given functions (draw table of variations and locate the local extrema).
- Find an equation of a tangent to the curve of a function at a point on the curve.
- Show that a given line is an oblique asymptote to the curve of a rational function.
- Study the relative positions of a curve and its oblique asymptote.
- Prove a given line as an axis of symmetry to the curve of a function.
- Prove a given point as a center of symmetry to the curve of a function.
- Graph the curve of a function.
- Solve equations and inequalities graphically.

## **7. Economic Functions**

### **COST-REVENUE-PROFIT FUNCTIONS**

Students should be able to:

- Find fixed and variable costs, and total cost function.
- Find the average cost and marginal cost functions.
- Find the revenue function given the price of an item.
- Find the profit function.
- Determine whether a company is at gain or loss and find break-even points.
- Find the maximum or minimum cost of a production function/maximum profit
- Interpret results economically using unit conversions.

### **DEMAND-SUPPLY**

Students should be able to:

- Find the quantity and price when the market is at equilibrium.
- Find the demanded/supplied quantities given the price or the price given the demanded/supplied quantity.
- Interpret results economically using unit conversions.

### **DEPRECIATION:**

Students should be able to:

- Calculate annual depreciation of an asset.
- Write the depreciation function and use it to find depreciation over time.
- Calculate the value of an asset after a certain period of time.
- Find the residue value of an asset.

## 8. Counting

Students should be able to:

- Count possibilities using the product principle.
- Solve counting problems of sampling with replacement (r-list).
- Solve counting problems of sampling without replacement (permutation).
- Use combinations to solve counting problems in which order doesn't matter. (basic level)

## 9. Probability

Students should be able to:

- Calculate the Probability of an event in the case of equally likely events.
- Calculate the probability of complementary events, event A or B ( $A \cup B$ ) and event A and B ( $A \cap B$ ).
- Compute basic conditional probabilities.