Limits – Full Chapter Revision Notes (MHT-CET Maths)

1. Concept of Limit

- The limit of a function describes the value that the function approaches as the input approaches a particular value.
- Notation: lim (x → a) f(x)

2. Standard Limits

- lim (x → 0) (sin x)/x = 1
- lim (x → 0) (tan x)/x = 1
- lim (x → 0) (1 – cos x)/x² = 1/2
- lim (x → 0) (e^x – 1)/x = 1
- lim (x → 0) (log(1+x))/x = 1

3. Basic Limit Laws

- lim (f(x) + g(x)) = lim f(x) + lim g(x)
- lim (f(x) – g(x)) = lim f(x) – lim g(x)
- lim (f(x) × g(x)) = lim f(x) × lim g(x)
- lim (f(x) / g(x)) = lim f(x) / lim g(x) (if denominator ≠ 0)

4. Important Trigonometric Limits

- lim (x → 0) (sin ax)/x = a
- lim (x → 0) (tan ax)/x = a
- lim (x → 0) (sin ax)/(bx) = a/b

5. Algebraic Method

- Factorization method – factor numerator and denominator to cancel common terms.
- Rationalization method – multiply by conjugate when roots are present.

6. Limits Involving Infinity

- lim (x → ∞) 1/x = 0
- lim (x → ∞) (ax + b)/(cx + d) = a/c

7. Important Results

- lim (x → 0) (a^x – 1)/x = ln(a)
- lim (x → ∞) (1 + 1/x)^x = e

8. Indeterminate Forms

- $0/0$
- ∞/∞
- $0 \times \infty$
- $\infty - \infty$

9. CET Problem Solving Tips

- First substitute the value.
- If form becomes 0/0, apply factorization or rationalization.
- Use standard limits where trigonometric functions appear.