Guidelines and Model Questions for Mathematics Aptitude Test

(1) **Statements and Implications**

Converse and Contrapositive , Negation

ex(i) If the statement:

"All drinkers are men" is true

then which of the following are also true:

(1) All non-drinkers are women

(2) All women are non-drinkers

(3)Some men are drinkers.

Ans. 2 **and** 3

ex(ii) If the statement:

"All drinkers are men" is false

then which of the following are also true:

(1) All drinkers are women

(2) All women are drinkers

(3) Some drinkers are women.

Ans. Only 3.

(2) **Basic Set Theory**

Universal and Null (empty) set, Complement of a set, Intersection and Union, Commutative and Associative Laws, De Morgan's Laws

(3) **Operations on sets**

Commutative and Associative Laws, To check these for given operations such as

(i) $a * b = \frac{ab}{2}$

(ii) $a \oplus b = a + \frac{b}{2}$

(4) **Meaning of Logarithm**

ex) Find:

  (i) $log_3 9$

  (ii) $log_1 01000$

  (iii) $log_3(\frac{1}{9})$

  (iv) $log_a(\frac{1}{a})$

(5) **Graphs of simple functions** such as:

   (i) $y = 2x + 3$
   (ii) $y = x^2$
   (iii) $y = x^3$
   (iv) $y = |x|$
   (v) $y = 2^x$

[All functions with Domain $\mathbb{R}$]
Range of these functions defined as Intervals.

(6) **Domain of Basic functions**

   (i) $f(x) = ax + b$
   (ii) $f(x) = \frac{1}{x}$
   (iii) $f(x) = \sqrt{x}$
   (iv) $f(x) = \log x$

(7)**Even and Odd Functions**

   (i) $f(x) = \cos^3 x$
   (ii) $f(x) = |\sin x|$
   (iii) $f(x) = e^{\sin x}$
   (iv) $f(x) = x^3 \cos 2x$

(8) **Solving inequalities** such as:

   (i) $x^2 > 9$
   (ii) $x^2 - 5x + 6 < 0$
   (iii) $x^2 - 3x + 2 > 0$

[Solution set to be expressed as an interval or union of 2 intervals]

(9) **Sequences (in $\mathbb{R}$)**
Increasing and Decreasing sequences, Bounded Sequences, Limit of a sequence (only concept)
ex) For the following sequences:
(i) $a_n = \frac{1}{n^2}$ (ii) $a_n = \frac{n+1}{n}$ (iii) $a_n = \frac{(-1)^n}{n}$

   (a) Write the first 5 terms
   (b) State whether increasing/decreasing/neither
   (c) State whether bounded above/below/neither
   (d) Find limit as $n \to \infty$ (if it exists).