Limitations of Dimensions Analysis:

1. *Dimensional Analysis can't derive relation or formula if a physical quantity depends upon more than three factors having dimensions.,*
2. *If dimensions are given, physical quantity may not be unique as many physical quantities have same dimensions. For example, if the dimensional formula of a physical quantity is $[M^1L^2T^{-2}]$, it may be work or energy or torque.*
3. *Numerical constant having no dimension such as 1/2, 1 or 2π etc. can't be deducted by the methods of dimensions.*
4. *The values of dimensionless quantity appeared in relation cannot be determined by this theory.*
5. *The method of dimension can't be used to derive relations* ***other than*** *product of power functions.*

   For example, $s = ut + \frac{1}{2}at2$ *can't be derived by using this theory.*

   It can't derive a relation having more than one part in an equation

   or

   $y = a\sin wt.$ *can't be derived by using this theory.*

6. This theory can't derive a formula containing trigonometric function, exponential function, and logarithmic function. However, the dimensional correctness of these can be checked.

7. This theory does not indicate whether the quantity is scalar or vector.

Exam Style Questions:

1. a. Is dimensionally correct equation necessarily to be a correct physical relation? What about dimensionally wrong equation?

b. Using the method of dimensions, derive an expression for the time period of simple pendulum which is assumed to be depends on mass $'m'$ *of the bob, length* $'l'$ *of the string and acceleration due to gravity* $'g'$.

2. a. Write the dimensions of universal gravitational constant and energy.

b. What is the dimension of α and a in the relation $p = ae^{\alpha t}$. *Where p is pressure.*

c. What is the dimension of a, b and c in $y = a\sin(bt - cx)$, *where, y is in m, t sec. and x is m.*

d. If the length of the certain specimen is $(6.2 \pm 0.1)cm$. *What does it mean?*