FAQ's

1. **Solve $(D^2+4)y=\sin 3x$.**

The complementary function is $y = c_1 \cos 2x + c_2 \sin 2x$ and a particular integral is y= $\frac{1}{D^2+4}\sin 3x = \frac{1}{(-3)^2+4}\sin 3x$

$= -\frac{1}{5}\sin 3x$

The solution is $y = c_1 \cos 2x + c_2 \sin 2x - \frac{1}{5}\sin 3x$

2. **Give the modification rule in method of undetermined co-efficients.**

If a term in your choice for $y_p(x)$ is a solution of the homogeneous equation $y^n + p_{n-1}(x)y^{n-1} + \ldots\ldots\ldots + p_1(x)y' + p_0(x)y = 0$, then multiply this term by x^k, where k is smallest positive integer such that this term timesx^k is not a solution of the above homogeneous equations.

3. **State the sum rule for the method of undetermined co-efficients.**

If r(x) is a sum of functions like $ke^{\gamma x}$, kx^n (n=0,1…….) etc. then $y_p(x)$ is any value like $ce^{\gamma x}$, kcoswx+msinwx……….etc.

4. **Give the theorem of linear independence theorem.**

Any number of solutions of the form $e^{\lambda x}$ are linearly independent on an open interval I if and only if the corresponding λ are all different.

5. Define simple complex root of a differential equations.

If complex roots occur, they must occur in conjugate pairs since the co-efficients of the differential equations are real. Thus if $\lambda = \gamma + iw$ is a simple root of characteristic equation so is the conjugate $\bar{\lambda} = \gamma - iw$ and two corresponding linearly independent solution are $y_1 = e^{\gamma x} \cos wx$, $y_2 = e^{\gamma x} \sin wx$,