Assignment 2   **21-08-09**

1. The centre of curvature of the wavefront in a TEMoo laser mode is not at z=0. Plot a graph for the separation of CoC from z=0 as a function of z.

2. *Plotting the Gaussian :*
    (a) Find the Full Width Half Maximum of the function –
    $$M(x) = M_0 \exp(-\frac{x^2}{p^2})$$ in terms of p.
    (b) Plot a graph between M and x and indicate M_0 and p on the graph.
    (c) On the same graph, draw the curves by changing p to 2p and 4p.

3. *Define the parameters :*
    (a) Spot size
    (b) Beam waist
    (c) Raleigh range

4. Plot the amplitude maximum of the intensity distribution as a function z. Indicate the Raleigh range on the graph.

5. Give three examples where Gaussian appears as a solution. Comment on the meaning of the FWHM in those examples.

6. For a plane wave that is propagating (Fig. P1.1) in the direction $\theta = 45^0$ $\phi = 45^0$ the light field observed at p(2,3,4)×10^{-6}m is expressed as

    $$E = E_0 e^{j67.32 - j2.44 \times 10^{15} t}$$

    (a)   Find the wavelength of light in the medium.
    (b)   Find the index of refraction of the medium.