The following method was used. (method of lines)

We use overall heat balance equation for the first grid.

$$mC * \left(\frac{dT}{dt}\right) = K * \left(\frac{d^2T}{dx^2}\right) + h(T - To) + e(Ts^4 - T^4)$$

For the other grids :

$$mC * \left(\frac{dT}{dt}\right) = K * \left(\frac{d^2T}{dx^2}\right) + h(T - To) + e(T(i+1)^4 - T(i)^4)$$

The odes were solved using **ode15s**

The spatial coordinate was discretized using 2nd order finite difference equations.

For the above results the parameter values were as follows (all S I units)

Thermal Conductivity = 0.1 J m^{-1} s^{-1} K^{-1}

Specific Heat = 1500 J kg^{-1} K^{-1}

Density = 800 kg m^{-3}

Temperature Surface = 1200K

Air Temperature = 300 K

Length, Width , Height = 1m

Overall Heat transfer coefficient = 32 J s^{-1} K^{-1} (around this value)