[illegible] equation no (i) we get

[illegible] (Legendre, Associated Laguerre Polynomial)

$R(r)$ or ψ_r is a function of r, the radial distance from the nucleus. This is therefore called the radial part of the wave function or simply the radial function and abbreviated as R. It depends on the quantum numbers n and l.

ψ_θ or $\Theta(\theta)$ is a function of θ

ψ_ϕ or $\Phi(\phi)$ is a function of ϕ

$\Theta(\theta)$ and $\Phi(\phi)$ represent the angular part of the wave function. They may also be combined into a single function $\psi_{\theta\phi}$ These functions depend primarily on the quantum number l and m_l.

<u>Radial Wave function, R</u> : The radial part of the wave function depends only on the values of 'n' and 'l'. The radial function for the first three orbitals in the hydrogen ~~atom are~~ like system

1s orbital ($n=1$, $l=0$) $\quad R = 2\left(\frac{Z}{a_0}\right)^{3/2} e^{-Zr/a_0}$

2s orbital ($n=2$, $l=0$) $\quad R = \left(\frac{1}{2\sqrt{2}}\right)\left(\frac{Z}{a_0}\right)^{3/2}\left(2-\frac{Zr}{a_0}\right) e^{-Zr/2a_0}$

2p orbital ($n=2$, $l=1$)

$$R = \frac{1}{2\sqrt{6}}\left(\frac{Z}{a_0}\right)^{3/2}\frac{Zr}{a_0}e^{-Zr/2a_0}$$

Where Z is the nuclear charge, e the base of natural logarithms and a_0 is the radius of the first Bohr orbit. Its value is 52.9 pm is determined by $a_0 = \frac{h^2}{4\pi^2 m e^2}$