Quantum Number :→ Number used to provide information about position, energy, momentum, spin etc. of an electron in an atom is called quantum number.

An electron in an atom can be completely characterized by set of four quantum number.

1) Principal Quantum Number (n)
2) Azimuthal Quantum Number (l)
3) Magnetic Quantum Number (m)
4) Spin Quantum Number (s)

1) Principal quantum Number (n) :→ It provide information about distance of electron from the nucleus as well as energy of electron

$n = 1, 2, 3, 4 ------ \infty$

2) Azimuthal Quantum Number (l) :→ It is also called subsidiary or angular momentum quantum number. It is denoted by the symbol "l"
Possible values of $l = 0, 1, 2, 3, ------ (n-1)$

If,

$n=1$ then $l=0$

$n=2$ then $l=0,1$

$n=3$ then $l=0,1,2$

$n=4$ then $l=0,1,2,3$

It provides information about angular momentum of an electron as well as shape of sub shell.

value of l	orbital/Sub shell	Shape.
0	s	◯
1	p	dumbell ∞
2	d	double dumbell
3	f	Complicated

3) Magnetic Quantum Number (m) → It is denoted by symbol "m". Possible values of

$m = -l$ to $+l$ including 0.

$m = -l \dots 0 \dots +l$

Or $m = (2l+1)$

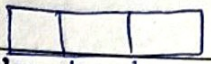
Date

It provides information about orientation of sub shell in the magnetic field.

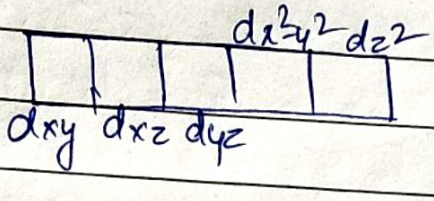
eg.

(i) If $l = 0$ (s)
$m = 0$

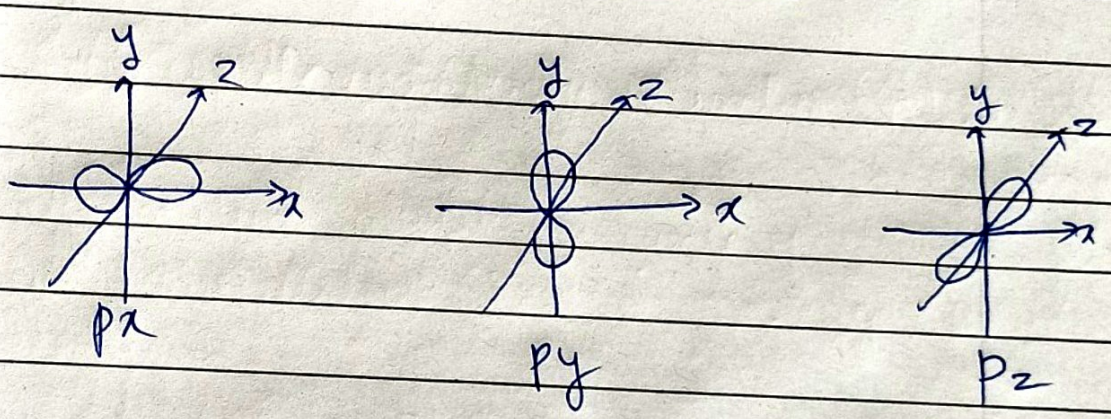
(ii) If $l = 1$ (p)
$m = -1, 0, +1$



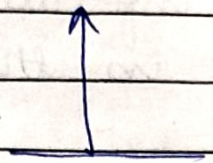
(iii) If $l = 2$ (d)
$m = -2, -1, 0, +1, +2$



Orientation of p-orbital



4) **Spin Quantum Number (s)** :- It is denoted by the symbol 's', values of S is independent from other quantum numbers.
Possible values of S = $+1/2$ and $-1/2$.
$+1/2$ is for clockwise spin and
$-1/2$ is for anticlockwise spin.



$S = +1/2$

Clockwise spin

$S = -1/2$

anticlockwise spin