Mechanics :-

Mechanics is study of motion.

Classical Mechanics & Quantum Mechanics Difference :-

In Classical Mechanics, we study motion of macro (→ Big / Heavy) objects, while in Quantum Mechanics, we study micro (→ Tiny) objects / particles

Introduction To Classical Mechanics

These objects are of size larger than 10^{-10} m (Range of atom).

Objects having size 10^{-10} m are atoms.

We study motion of our daily life objects, in classical mechanics. Newton gave equations of motion of such objects. These objects have low velocity (less than 1/10 of speed of light).

Word Quantum:-

Quantum means "light".

Introduction To Quantum Mechanics:-

In this branch, we study motion of atomic size particles having range 10^{-10} m. We study particles, atoms, molecules & constituents etc. These particles travel with high/fast speed (greater than one tenth of speed of light).

speed of light = $c = 3.0 \times 10^8$ m/s

Assumptions of classical Mechanics:-

There are two assumptions:-

(i) Dynamical variables are denoted by $q_i(t)$, $1 \le i \le N$. for each value of time (t), $q_i(t)$ has a definite value. (Dynamical variables are such quantities used to describe a system of n classical mechanics such as coordinates of particles, component of velocity)

(ii) The development of a physical state, at any time is given

by dynamical variables, $q_i(t)$
If variable change → development
changes. If no development
changes its mean variables
are changing. Physical state
of a body is given by
$q_i(t)$ w.r.t time initial
time.

Laws of force:

phenomena involving lengths
distances larger then 10^{-6} m
are discussed by C.M.
We study first two laws
of force

Gravitational force:

$F = G \frac{m_1 m_2}{r^2}$

force that is directly
proportional to their masses
and inversly prop to the
square of distance b/w centres

Columb's Law:

$F = k \frac{q_1 q_2}{r^2}$

force of attraction / repulsion
b/w two points ∝ directly

proportional to product of mag of charges & inversly prop to square of distance b/w them,

Then we can say that

(i) → Inverse square law of gravitational attraction b/w two massive bodies.

Coulumb's inverse square law of repulsion or attraction b/w two charged bodies.

History of Quantum Mechanics

To discuss History, we will form four parts / categories :-

1) Classical Mechanics.
2) Old Quantum Mechanics.
3) New Quantum Mechanics.
4) Quantum field Theory.

* Classical Mechanics :-

This is study of motion of bodies upto 1900. This described motion of bodies having size greater than 10^{-6} m.

* Old Quantum Mechanics :-

It's period is 1901 to 1925. This stage was introduced by Plank. It all results were not satisfactory. Its ideas are classical + non-classical.

* New Quantum Mechanics :-

It's period is 1905 to 1947

Different but equivalent view points were by Schrödinger & Heisanburg. Difficulties of old Quantum Mechanics were corrected. This stage is also called wave mechanics. Schrödinger forming his equations has taken waves instead of particles.

* Quantum Field Theory :-

Wave mechanics also require corrections. QFT theory also agree with wave Theory/mechanics & also gives new predictions. QFT started/introduced since 1947 --

History of Quantum Mechanics

Classical Mechanics	Old Q.M	Wave Mechanics N.Q.M	Q.F.T
period: 1900	1901-1925	1925-1947	1947--
Size: $\gg 10^{-6}$ m	$\not\gg 10^{-10}$ m	$\not\ll 10^{-10}$ m	10^{-15} m