Electromagnetic spectrum: The arrangement of electromagnetic waves in increasing/decreasing order of wavelength or frequency is called electromagnetic spectrum.

Name	***Frequency(Hz)/* Wavelength range**	***Basic source* /Production**	**Detection**	**Main properties**	**Uses**
Radiowaves	10^4-10^8 *Hz* 600m-0.1m	*Rapid acceleration and deaccelerations of electrons in aerials* LC oscillations	Receivers aerials Diodes	Reflection, diffraction	radio communication
Microwaves	10^9-10^{12} *Hz* 0.1 m-1 mm	*Rotation of molecules* Klystron valve or magnetron valve.	Point contact diodes.	Reflection, refraction, diffraction, polarization etc	✓ Radar communication. ✓ Analysis of fine details of molecular and atomic structure. ✓ Satellite ✓ Microwave
Infrared	10^{11}- 5x10^{14}*Hz* 1 mm-700nm	*Vibration of atoms and molecules* Heaters	Thermopiles bolometer infrared Photographic film.	Heating effect, reflection, refraction, polarization	✓ Useful for elucidating molecular structure. ✓ Physiotherapy ✓ Less scattered than visible light by atmospheric particles useful for haze photography ✓ Remote control
Visible light	*(4-7)*x10^{14}*Hz* 700 - 400 nm	*Electrons in atoms emit light when they move from one energy level to a lower energy level* Filament lamp, sun, flames	Human eye photocells photographic film.	Reflection, refraction, interference, diffraction, polarization, photoelectric effect etc	Help in visualization Can cause chemical reaction

Ultraviolet	10^{16}-10^{17} *Hz* 400 nm-1 nm	*Jumping of electrons in inner shells* Carbon arc, discharge tubes, sun	Photocells photographic film.	✓ Absorbed by glass. ✓ Tanning of the human skin ✓ Ionize atoms in atmosphere resulting in the ionosphere.	✓Studying molecular structure ✓Food preservation ✓Sterilization surgical instruments ✓ Used by insect to locate nector ✓Released in welding
X - rays	10^{6} -10^{19} *Hz* 1 nm-10^{-3}nm	*Bombarding targets with very fast electrons* X – ray tubes	Photographic film, Geiger tubes, ionization chamber.	Effect photographic plate, ionization of gases, photoelectric effect, more energetic than UV- rays	✓ Radiography- medical diagnosis ✓ Study of crystal structure ✓ For detecting fault, crack, flaws ✓ Radiotherapy
Gamma rays	10^{18}- 10^{22} *Hz* <10^{-3} nm	*Radioactive decay of the nucleus*. Cyclotron, radioactive elements	Photographic film, Geiger tubes, Ionization chamber.	Similar to X – rays. High penetration power	✓ Radiotherapy ✓ Initiate nuclear reaction ✓ Preservation of food ✓ Study the structure of nuclei