EngineeringRise

Electromagnetic spectrum and applications

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Wave relation	c = f lambda; lambda (m) = 300/f (MHz) Valid when: vacuum or air; the 300/f shortcut needs f in MHz	m/s (m, Hz)
Order of increasing frequency	radio < microwave < infrared < visible < ultraviolet < X-ray < gamma	none
Visible range	about 400 nm to 700 nm (approximate)	nm
Radar distance	d = c t/2 Valid when: pulse reflects back to the same point, travelling at c	m
Standing-wave node spacing	adjacent nodes lambda/2 apart Valid when: standing wave from two equal waves travelling oppositely	m
Prefixes	k = 10^3, M = 10^6, G = 10^9, nm = 10^-9 m	none
Speed in vacuum	same value c = 3.0 x 10^8 m/s for every region Valid when: vacuum (free space)	m/s
Ratio of frequencies	f1/f2 = lambda2/lambda1 (same medium) Valid when: same medium (or vacuum), so the speed is the same	none

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/electromagnetic-waves/electromagnetic-spectrum-and-applications

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