IMPORTANT JEE-NEET FORMULAS

Heat and Thermodynamics

Topics	Formulas
Conduction	Rate of flow of heat in conduction is determined as $$\frac{dQ}{dt} = -KA\frac{dT}{dx}$$ K = thermal conductivity A = area of cross-section dx = thickness dT = temperature difference
Thermal resistance to conduction	Thermal resistance is given as $$R = \frac{L}{KA}$$ K = material's conductivity L = plane thickness A = plane area
Kirchhoff's Law	$$\frac{Emissive\ power\ of\ body}{Absorptive\ power\ of\ body} = Emissive\ power\ of\ black\ body$$
Nature of thermal radiations (Wien's displacement law)	$$\lambda_{max} \propto \frac{1}{T}$$ $$\lambda_{max}\, T = b$$ λ_{max} = wavelength of peak of blackbody radiation curve b = $0.282\ cm\ K$ = Wein's constant T = temperature
Stefan- Boltzmann's law	$u = \sigma AT^4$ (Perfect black body) $u = e\sigma AT^4$ (Not a perfect black body) here, σ = Stefan's constant = $5.67 \times 10^{-8}\ watt\ /\ m^2K^4$ $\frac{u}{A}$ = energy flux e = emissivity
Newton's law of cooling	$$\frac{d\theta}{dt} = (\theta - \theta_0)$$ Here, $\theta\ and\ \theta_0$ = temperature corresponding to object and surroundings.
Temperature scales	$$F = 32 + \frac{9}{5} \times C$$ $$K = C + 273.16$$

	F = Fahrenheit scale C = Celsius scale K = Kelvin scale
Ideal Gas equation	$$PV = nRT$$ Here, n = number of moles P = pressure V = Volume T = Temperature
Van der Waals equation	$$(p + a(\frac{n}{V})^2)(V - nb) = nRT$$ $a(\frac{n}{V})^2$ = correction factor for intermolecular forces nb = correction factor for molecule size n = number of moles T = Temperature V = Volume p = pressure
Thermal expansion	Linear Expansion $$L = L_0(1 + \alpha\Delta T)$$ Area Expansion $$A = A_0(1 + \beta\Delta T)$$ Volume Expansion $$V = V(1 + \gamma\Delta T)$$
Relation between α, β and y for the isotropic solid	$$\frac{\alpha}{1} = \frac{\beta}{2} = \frac{\gamma}{3}$$