IMPORTANT FORMULA SHEET FOR PHYSICS MHT CET

CHAPTER:- ELECTRIC CHARGES & FIELDS

COMPONENT/PARAMETER THEOREM/PRINCIPLE/CONDITION	FORMULA(S)	SI UNIT(S)
1) Electric Charge Q or q	$q = ne = it = \frac{V}{r}.t = \frac{w}{v}\ OR\ \frac{\vec{F}}{\vec{E}}$	C
2) Electric Field E	$E = q.V = \frac{d\emptyset}{dA} = \frac{Kq}{r^2} = \frac{\sigma}{\varepsilon_0}$	N/C
3) Linear Charge Density	$\lambda = \frac{Q}{L} = \frac{dQ}{dl}$	C/m
4) Surface Charge Density	$\sigma = \frac{Q}{A} = \frac{dQ}{dA}$	C/m^2
5) Volume Charge Density	$\rho = \frac{Q}{V} = \frac{dQ}{dV}$	C/m^3
6) Electric Flux	$\emptyset = \int E.da = \vec{E}.\vec{A} = E.A\,Cos\theta$	Nm^2/C
7) Gauss Theorem	$\emptyset = \int E.da = q/\varepsilon_0$	Nm^2/C
8) Electric Force	$F = \frac{q1.q2}{4\pi\varepsilon_0 r^2}$	N
9) Torque	$\tau = p\ X\ E = p.Esin\theta$	Nm
10) Electric Dipole Moment	$p = q.2l = q.d$	C-m
11) Acceleration of charged particles	$a = \frac{F}{m} = \frac{qE}{m}$	m/s^2
12) Electric Field due to Axial Line	$E_{axial} = \frac{2\vec{P}}{4\pi\varepsilon_0 x^3}$	N/C
13)) Electric Field due to Equitorial Line	$E_{equitorial} = \frac{\vec{P}}{4\pi\varepsilon_0 (x^2 + a^2)^{\frac{3}{2}}}$	N/C

CHAPTER:- ELECTROSTATIC POTENTIAL & CAPACITANCE

14) Electric Potential	$V = \frac{Kq}{r} = \frac{q}{4\pi\varepsilon_0 r}$	Volt
15) Capacitance	$C = \frac{q}{V}$	F

16) Parallel plate Capacitor	$$C = \frac{\varepsilon_0 A}{d} = \frac{k\varepsilon_0 A}{d}$$	*F*
17) Cylindrical Capacitor (R2>R1)	$$C = \frac{2\pi\varepsilon_0 l}{\ln\frac{R2}{R1}}$$	*F*
18) Spherical Capacitor (R2>R1)	$$C = \frac{4\pi\varepsilon_0 R1R2}{R2 - R1}$$	*F*
19) Electric Field of Parallel plate Capacitor	$$E = \frac{\sigma}{\varepsilon_0} = \frac{q}{A\varepsilon_0}$$	*N/C*
20) Electric Field of Cylindrical Capacitor (R2>R1)	$$E = \frac{\lambda}{2\pi\varepsilon_0 R}$$	*N/C*
21) Electric Field of Spherical Capacitor (R2>R1)	$$E = \frac{Q}{(4\pi\varepsilon_0 R^2)}$$	*N/C*
22) Force between plates of the Capacitor	$$F = \frac{Q}{2k\varepsilon_0 A}$$	*N*
23) Energy stored in the Capacitor	$$E = \frac{QV}{2} = \frac{CV^2}{2} = \frac{Q^2}{2C}$$	*N/C*
24) Force per unit area between the plates	$$F = \frac{\sigma^2}{2k\varepsilon_0}$$	*N*
25) Resultant Electric Field at corner of a triangular plane	$$E = \sqrt{Ea^2 + Eb^2 + 2Ea.Eb\,Cos\theta}$$	*N/C*
26) Resultant Electric Field due to n charges	$$E = \sum_{i=1}^{n} Ei$$	*N/C*
27) Resultant Electric Potential due to n charges	$$V = \frac{1}{4\pi\varepsilon_0}\sum_{i=1}^{n}\frac{qi.q(i+1)}{ri}$$	*V*
28) Distance between the parallel plate Capacitor	$$d = \frac{V}{E}$$	*m*
29) Effective Series Capacitance	$$Cs = \sum_{i=1}^{n}\frac{1}{Ci}$$	*F*
30) Effective Parallel Capacitance	$$Cp = \sum_{i=1}^{n} Ci$$	*F*
31) Electric potential at the centre of a cube	$$V = \frac{4q}{\sqrt{3}\pi\varepsilon_0 l}$$	*V*
32) For charged isolated conducting Sphere	$$C = 4\pi\varepsilon_0 R \;\&\; V = \frac{Q}{4\pi\varepsilon_0 R}$$	*F*

33) Effective Potential of n capacitors connected in series across a battery	$$V = \frac{\sum_{i=1}^{n} Ci.Vi}{\sum_{i=1}^{n} Ci}$$	***V***
34) Relation between Dielectric const K with Capacitance & Electric Field	$$K = \frac{C}{C_0} = \frac{E_0}{E_0 - E_p} = 1 + \chi$$ ***Here,*** $E_0 is\ uniform\ E.field\ \&\ E_p\ is\ \ Polarising\ Field$	***NA***
35) Polarization	$\overline{P} = \varepsilon_0 \chi \overline{E}$, $\chi - Electric\ Susceptibility$ $\overline{E} - \ Resultant\ E - field$	***N/C***
36) Effect of Dielectrics in Capacitors	$$C = \frac{K\varepsilon_0 A}{K(d-t)+t} = \frac{K\varepsilon_0 A}{d}, [t = d]$$ *Here, d-separation b/w plates, t-thickness of dielectric*	***F***
37) Effective Energy stored in Capacitors connected in series	$$U = \frac{Q^2}{2}\sum_{i=1}^{n}\frac{1}{Ci}$$	***J***
38) Effective Energy stored in Capacitors connected in parallel	$$U = \frac{V^2}{2}\sum_{i=1}^{n} Ci$$	***J***
39) Electric Potential Difference	$$\Delta V = V_B - V_A = \frac{W_{AB}}{q_0} = -\int_A^B \vec{E}.\vec{dl}$$	***JC^{-1} or NmC^{-1} or V***
40) Electric Potential due to point charge	$$V = \frac{1}{4\pi\varepsilon_0}.\frac{q}{r}$$	***V***
41) Electric Potential due to group of point charges	$$V = \frac{1}{4\pi\varepsilon_0}\sum_{i=1}^{n}\frac{qi}{ri}$$	***V***
42) Electric Potential due to an Electric Dipole	$$V = \frac{pCos\theta}{4\pi\varepsilon_0 r^2}$$	***V***
43) Electric Potential on Axial line of Dipole	$$V = \frac{P}{4\pi\varepsilon_0 r^2}, \theta = 0°$$	***V***
44) Electric Potential on Equitorial line of Dipole	$$V = 0, \theta = 90°$$	***V***
45) Electric Potential due Charged Sphere on surface and inside sphere	$$V = \frac{1}{4\pi\varepsilon_0}.\frac{Q}{R}$$	***V***
46) Electric Potential at points outside the sphere	$$V = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r}, r > R$$	***V***
47) Electrostatic Potential Energy	$$U = \frac{1}{4\pi\varepsilon_0}.\frac{q1.q2}{r}$$	***J***
48) Potential energy of Dipole in Uniform Electric field	$$U = -\vec{P}.\vec{E}$$	***J***

49) Work done & potential energy relation	$W = \Delta U = U_f - U_i = -P.E(Cos\theta_f - Cos\theta_i)$	***J***

CHAPTER- CURRENT ELECTRICITY

50) Electric Current	$I = \frac{dQ}{dt} = \frac{V}{R} = \vec{v_d}.neA$	***A***
51) Drift Velocity	$\vec{v_d} = \frac{-e\vec{E}}{m}.\tau$	***m/s***
52) Mobility	$\mu = \frac{\vec{v_d}}{E} = \frac{e\tau}{m}$	***m^2/V-s***
53) Resistance	$R = \frac{V}{I} = \frac{\rho L}{A} = \frac{Ml}{ne^2A\tau}$	***Ω***
54) Resistivity Vs Conductivity	$\sigma = \frac{1}{\rho}$	***Sm^{-1}***
55) Conductance	$G = \frac{1}{R}$	***$Ω^{-1}$ or mho***
56) Effect of temperature on Resistance and Resistivity	$\alpha = \frac{R_f - R_i}{R_i(t_f - t_i)}, \alpha_r = \frac{\rho_f - \rho_i}{\rho_i(t_f - t_i)}$	***K^{-1}***
57) Current Density	$j = \frac{I}{A} = \sigma.E = \frac{E}{\rho} = \frac{V}{\rho l}$	***Am^{-2}***
58) Resistors in Series	$R_s = \sum_{i=1}^{n} R_i$	***Ω***
59) Resistors in Parallel	$\frac{1}{R_p} = \sum_{i=1}^{n} \frac{1}{R_i}$	***Ω***
60) Discharging of a cell with internal resistance r	$V = E - Ir$	***V***
61) Charging of a cell with internal resistance r	$V = E + Ir$	***V***
62) Effective Potential of Parallel combination of cells	$V = \frac{V1.r2 + V2.R1}{r1 + r2} = \frac{\sum_{i=1}^{n} Ei.rn}{\sum_{i=1}^{n} ri}$	***V***
63) Effective internal resistance of Parallel combination of cells	$r = \frac{r1.r2}{r1 + r2}$	***Ω***
64) KVL or Loop Law	$\sum V = \sum IR$	***V***

65) KCL or Junction Law	$\sum i = 0$	*A*
66) Wheatstone Bridge condition	$\frac{P}{Q} = \frac{R}{S}$	*NA*
67) Meter Bridge Condition	$\frac{R}{S} = \frac{l}{100 - l}$	*NA*
68) Potential Gradient	$K = \frac{V}{l}$	*V/m*
69) Potentiometer for gradient measurement	$K = \frac{1}{l} \cdot \left(\frac{V}{R + r}\right) . r$	*V/m*
70) Potentiometer for internal resistance measurement	$r = \left(\frac{l1}{l2} - 1\right) . R$	*Ω*
71) Potentiometer for comparision of EMF's	$\frac{E1}{E2} = \frac{l1}{l2}$	*NA*
72) Heating Effect of current or Joule's Heating Effect	$H = P.t = Vi.t = i^2 R.t = \frac{V^2}{R} . t$	*J*
73) Electric Power	$P = \frac{W}{t} = Vi = i^2 R = \frac{V^2}{R}$	*W*
74) Horse Power & Watt relation	$1HP = 746W$	*Conv*
75) Electric Energy	$E = P.t = H$	*J*
76) Commercial Unit of Energy	$1\ KWh = 1000Wh = 3.6 * 10^6 J$	*Conv*
77) Max current drawn by cell	$I = \frac{V}{R + r}$	*A*

CHAPTER: MOVING CHARGES & MAGNETISM

78) Magnetic Force	$\vec{F} = q(\vec{v}\, X\, \vec{B}) = qvB\ Sin\theta$	*N*
79) Magnetic Flux	$\emptyset = \vec{B}.\vec{A} = BA\ Cos\theta$	*Wb or Tm^2*
80) Biot Savart Law	$dB = \frac{\mu_0}{4\pi} . \frac{i.dl\ Sin\theta}{r^2}$	*T*
81) Biot Savart Law Vectorially	$dB = \frac{\mu_0 i}{4\pi} . \frac{\vec{dl}\, X\, \vec{r}}{r^3}$	*T*
82) Magnetic field at distance d due to circular coil carrying current I having radius r	$B = \frac{\mu_0 i}{4\pi} . \frac{2\pi r^2}{(r^2 + d^2)^{\frac{3}{2}}}$	*T*

83) Magnetic field at centre of circular coil carrying current I having radius r	$B = N.\frac{\mu_0 i}{2r}$	T
84) Ampere's Law	$\oint \vec{B}.\vec{dl} = \mu_0 i$	NA
85) Magnetic field due to solenoid	$B = \frac{\mu_0 Ni}{l} = \mu_0 ni\ , n = \frac{N}{l}$	T
86) Magnetic field at edges of short distance solenoid	$B = \frac{\mu_0 Ni}{2l} = \frac{\mu_0 ni}{2}$	T
87) Magnetic field due to toroid with average radius r	$B = \mu_0 Ni, n = \frac{N}{2\pi r}$	T
88) Force of charged particle in Electric field	$\vec{F} = q.\vec{E}$	N
89) radius of cyclotron in magnetic field	$r = \frac{mv}{qB} = \frac{\sqrt{2m.KE}}{qB} = \frac{mv}{Be}$	m
90) potential difference of cyclotron in magnetic field	$V = \frac{r^2 q^2 B^2}{2mq}$	V
91) Time period of cyclotron	$T = \frac{2\pi m}{qB}$	s
92) Cyclotron Frequency	$v = \frac{qB}{2\pi m}$	Hz
93) Force of current carrying conductor in Magnetic field	$\vec{F} = i.(\vec{l}\ X\ \vec{B}) = Bil\ Sin\theta$	N
94) Force between two parallel conductors carrying currents i1 & i2 with separation r	$F = \frac{\mu_0}{2\pi}.\frac{l.i1.i2}{r} = \frac{\mu_0}{4\pi}.\frac{2.i1.i2}{r}$	N
95) Torque experienced by current carrying loop in magnetic field	$\vec{\tau} = \vec{M}\ X\ \vec{B} = M.B\ Sin\theta = NIAB\ Sin\theta$	Nm
96) Magnetic dipole of an atom	$M = n.\frac{eh}{4\pi m} = n.\mu_B$ $\mu_B \rightarrow Bohr\ magneton = 9.27\ X\ 10^{-24} J/T$	J/T
97) Current in MCG	$i = \frac{K}{NAB}.\alpha$	A
98) Current sensitivity of Galvanometer	$I_s = \frac{\alpha}{i} = \frac{NAB}{K}$	°/A
99) Voltage sensitivity of Galvanometer	$V_s = \frac{\alpha}{V} = \frac{NAB}{KR}$	°/V
100) Conversion of Galvanometer to Voltmeter	$Total\ R = R + G, I_g = \frac{V}{R+G}, R = \frac{V}{I_g} - G$	NA
101) Conversion of Galvanometer to Ammeter	$S = \frac{I_g}{I - I_g}.G$	ohm

CHAPTER: MAGNETISM & MATTER

102) Magnetic Field strength at a point due to Bar Magnet	$B = \frac{\mu_0}{4\pi}.\frac{M}{r^3}.\sqrt{1+3Cos^2\theta}$	***T***
103) Magnetic Field along axial line of short Bar Magnet	$B = \frac{\mu_0}{4\pi}.\frac{2Mr}{4\pi(r^2-l^2)^3}$	***T***
104) Magnetic Moment	$M = m.2l$	
105) Magnetic Field along 7quatorial line of short Bar Magnet	$B = \frac{\mu_0}{4\pi}.\frac{M}{4\pi(r^2+l^2)^{\frac{3}{2}}}$	***T***
106) Torque on Magnetic Dipole in Uniform Magnetic Field	$\tau = MB\ Sin\theta$	***Nm***
107) Time period of oscillation of Bar magnet in Uniform Magnetic Field	$T = 2\pi\sqrt{\frac{I}{MB}}$	***s***
108) Potential Energy of Dipole due to current loop in Magnetic Field	$U = -\vec{M}.\vec{B} = -MB\ Cos\theta$	***J***
109) Workdone in rotating Magnetic Field	$W = \Delta U = -MB(Cos\theta 2 - Cos\theta 1)$	***J***
110) Angle of Dip Vs Horizontal & Vertical components of Earth's Magnetic Field	$B_V = B\ Sin\delta,\quad \frac{B_V}{B_H} = Tan\delta,$ $B = \sqrt{{B_V}^2 + {B_H}^2}$	***°, T***
111) Atom as Magnetic Dipole	$M = n.\frac{eh}{4\pi m} = n.\mu_B$ $\mu_B \rightarrow Bohr\ magneton = 9.27\ X\ 10^{-24}J/T$	***Am^{-2}***
112) Relative Permeability	$\mu_r = \frac{B}{B_0} = \frac{\mu}{\mu_0}$	***WbA^{-1}***
113) Magnetizing Force or Magnetic Intensity	$H = ni = \frac{B}{\mu}$	***Am^{-1}***
114) Intensity of Magnetization	$\vec{I} = \frac{\vec{M}}{V}, I = \frac{m}{A}$	***Am^{-1}***

115) Magnetic Susceptibility	$\chi = \frac{I}{H}$	***NA***
116) Curie's Law	$\chi_m = \frac{I}{H} = \frac{C}{T}$	***NA***

CHAPTER: ELECTROMAGNETIC INDUCTION

117) Magnetic Flux	$\emptyset = \vec{B}.\vec{A} = BA\,Cos\theta$	***Tm^2***
118) Faraday's Law of E I	$\lvert\varepsilon\rvert \propto \frac{d\emptyset}{dt}, \varepsilon = -\frac{d\emptyset}{dt} = -\frac{d}{dt}(BNACos\omega t)$ $= BNA\omega Sin\omega t$ $= \varepsilon_0 Sin\omega t$	***V***
119) Lorentz Force	$F = q(\vec{E} + \vec{v}\,X\,\vec{B})$	***N***
120) Self Induction	$\emptyset = Li, \varepsilon = L.\frac{d\emptyset}{dt} = \frac{d\emptyset}{dt}.\mu_0 n^2 lA.(for\ solenoid)$	***Tm^2,V,H***
121) Mutual Inductance	$\emptyset_2 = M_{21}i_1, \quad \varepsilon_2 = \frac{d\emptyset_2}{dt} \quad so\ \varepsilon_2 = M_{21}.\frac{di_1}{dt}$ $\emptyset_1 = M_{12}i_2, \quad \varepsilon_1 = \frac{d\emptyset_1}{dt} \quad so\ \varepsilon_1 = M_{12}.\frac{di_2}{dt}$	***Tm^2,V***
122) Mutual Inductance of two long Solenoids	$M = \frac{\mu_0 N_1.N_2.A}{l} = \mu_0 n_1.n_2.A.l$	***H***
123) Energy stored in current carrying Inductor	$U = \frac{Li^2}{2}$	***J***
124) Emf induced by moving rectangular loop in Uniform magnetic field	$\varepsilon = Blv = iR$	***V***
125) Power consumed by the rod suspended in Magnetic field	$P = F.v = Bilv$	***W***
126) Power lost / loss	$P = i^2R = V = \frac{dW}{dt}$	***W***
127) Workdone by moving rectangular strip by a distance d in uniform magnetic field	$W = F.d = qvBd$	***J***
128) Force required to move a rod in uniform magnetic field	$F = \frac{B^2l^2v}{R}$	***N***
129) EMF induced by a rod rotating in uniform circular motion with angular velocity in uniform magnetic field.	$\varepsilon = \frac{B\omega l^2}{2}$	***V***

CHAPTER: ALTERNATING CURRENT

130) Instantaneous AC current	$I = I_m Sin\omega t, \quad \omega = 2\pi m, \quad I_m = \frac{V_m}{R}$	A, Rad/s
131) Instantaneous AC EMF	$E = E_m Sin\omega t, \quad \omega = 2\pi v$	V, Rad/s
132) Average AC current	$I_{av} = \frac{2I_m}{\pi} = 0.636 I_m$	A
133) RMS AC current	$I_{rms} = \frac{I_m}{\sqrt{2}} = 0.707 I_m$	A
134) RMS AC Voltage	$V_{rms} = \frac{V_m}{\sqrt{2}} = 0.707 V_m$	V
135) AC through Resistor	$V = IR$	V
136) AC through Inductor	$V = L.\frac{dI}{dt}, \quad \frac{V_{rms}}{I_{rms}} = X_L = \omega L = 2\pi v L$	V,ohm
137) AC through Capacitor	$I = C.\frac{dV}{dt}, \quad \frac{V_{rms}}{I_{rms}} = X_C = \frac{1}{\omega C} = \frac{1}{2\pi v C}$	A,ohm
138) AC through series LCR Ckt	$V = V_m Sin\omega t, \quad I = I_m Sin(\omega t - \emptyset)$ $X_L > X_C, \quad \frac{V_m}{I_m} = \frac{V_{rms}}{I_{rms}} = Z = \sqrt{R^2 + (X_L - X_C)^2}$ $\emptyset = \tan^{-1}(\frac{X_L - X_C}{R})$	V,A,ohm,°
139) Resonance of series LCR Ckt	$Condition \ X_L = X_C, \quad then$ $f = \frac{1}{2\pi\sqrt{LC}}, \quad I_{rms} = \frac{V_{rms}}{R}, \quad P_{loss} = {I_m}^2 R$	Hz, A,W
140) Quality Factor	$Q = \frac{\omega L}{R}$	NA
141) Power Dissipation in AC Ckt	$P_{av} = V_{rms} I_{rms}. Cos\emptyset$	W
142) LC Oscillator Ckt	$U = \frac{{q_m}^2}{2C}$	J
143) Magnetic Energy in Inductor	$U_B = \frac{L{I_m}^2}{2}$	J
144) Transformer ratio	$\frac{N_s}{N_p} = \frac{V_s}{V_p} = k, \ \ if\ k < 1\ it's\ step\ down$ $if\ K > 1\ it'sstep\ up\ transformer$ $\frac{I_p}{I_s} = \frac{V_s}{V_p} = \frac{N_s}{N_p},$ $Efiicency\ \eta = \frac{power\ o/p}{power\ i/p} X100$	NA

CHAPTER: RAY OPTICS AND OPTICAL INSTRUMENTS

Law of Reflection	$i = r$	°
Law of refraction	$\frac{Sin\ i}{Sin\ r} = n = n_{21} = \frac{1}{n_{12}} = \frac{v_1}{v_2}$	NA
Mirror Equation and relations	$f = \frac{R}{2}, \quad \frac{1}{f} = \frac{1}{v} + \frac{1}{u}$	m
Focal length and Radius of curvature relation	$f = \frac{R}{2}$	cm
Linear Magnification of Mirror	$m = \frac{h'}{h} = -\frac{v}{u}$	NA
Linear Magnification of lens	$m = \frac{h'}{h} = \frac{v}{u}$	NA
Mirror Magnification in terms of focal length	$m = \frac{f}{f - u}$	NA
Critical Angle	$Sin\ i_c = n_{21} = \frac{v_1}{v_2}$	°
Critical Angle relation with Refractive Index μ	$i_c = Sin^{-1}\left(\frac{1}{\mu}\right)$	°
Time taken t by light in optical fibre to travel a distance of x cm is	$t = \frac{\mu x}{C}, here\ C = 3\ x\ 10^8\ m/s$	sec
Critical Angle relation with relative refractive index	$Sin\ i_c = n_{21} = \frac{v_1}{v_2}$	°
Object and image distance of curved spherical surface having radius R	$\frac{n_2}{v} - \frac{n_1}{v} = \frac{n_2 - n_1}{R}$	NA
Lens Makers Formula Refraction at spherical surface	$\frac{1}{f}(n_{21} - 1) = \frac{1}{R_1} - \frac{1}{R_2}$	m
Lens Formula and relations	$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}, \quad m = \frac{v}{u} = \frac{h^I}{h}$	m
Power of lens	$P = \frac{1}{f} = \frac{1}{v} - \frac{1}{u}$	D
Effective Focal length of lens combination	$\frac{1}{f_{eff}} = \sum_{i=1}^{n} \frac{1}{f_i}$	m
Effective Power of lens combination	$P_{eff} = \sum P_i$	D
Effective magnification of lens combination	$m_{eff} = \prod m_i$	NA
Prism Relations and Angle of prism	$r = \frac{A}{2}, \quad i = \frac{A + D_m}{2}, \quad D_m = 2i - A$ $\mu = \frac{Sin(A + \delta_m)}{Sin(\frac{A}{2})}$	°
Least distance of distinct vision	$D = 25cm$	cm
Near point of the eye	$N = 2.5cm$	cm

Microscope relations and formula	$m = m_0 . m_e = \frac{L}{f_0} X \frac{D}{f_e}$	*NA*
Telescope relations and formula	$m = \frac{f_0}{f_e}$	*NA*
Microscope maximum magnification	$M_{max} = \left(1 + \frac{D}{f_e}\right),$	*NA*
Microscope magnification using image and object distances	$\lvert mD \rvert = \frac{vo}{uo}(1 + \frac{D}{fe})$	*NA*
Effective Magnification or Total Magnification of Microscope	$m = m_o \times m_e$	*NA*
For Plane mirror	$u = v$	*cm*

CHAPTER: WAVE OPTICS

Light wavelength, velocity, refractive index and frequency relation	$n_1 = \frac{C}{v_1}, n_2 = \frac{C}{v_2}, n_1 . Sin\ i = n_2 . Sin\ r$ $\frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2}$	
Critical angle relation with relative refractive index	$Sin\ i_c = \frac{n_2}{n_1}$	*NA*
Doppler Shift	$\frac{\Delta v}{v} = \frac{-v_{radial}}{C}$	*NA*
Path Difference	$\Delta S = \frac{n\lambda}{2},\ (n = 0, 1, 2, 3, \ldots.)$*for Constructive Interference* $\Delta S = \left(n + \frac{1}{2}\right)\lambda, (n = 1, 2, 3 \ldots)$*for Destructive Interference*	*m*
Intensity Relation	$I = 4\ I_0 (Cos^2 \frac{\emptyset}{2})$	
Phase difference	$\emptyset = \frac{2\pi}{\lambda}\ X\ \Delta S$	*°*
YDSE	$\Delta S = \frac{xd}{D}, \quad x_n = \frac{n\lambda D}{d}, (n = 0, \pm 1. \pm 2 \ldots)\ C.I$ $x_n = \left(n + \frac{1}{2}\right) . \frac{\lambda D}{d}, (n = \pm 1, \pm 2 \ldots) D.I$	*m*
Fringe width in YDSE	$\beta = x_{n+1} - x_n = \frac{\lambda D}{d}$	*m*
For single slit diffraction	$\theta = \frac{\lambda}{a}, \quad minima\ @\ \theta = \frac{n\lambda}{a}\ (n = \pm 1, \pm 2, \ldots)$ $maxima\ @\ \theta = \left(n + \frac{1}{2}\right)\frac{\lambda}{a} (n = 0, \pm 1, \pm 2 \ldots)$ $\frac{2}{3} . a\ X\ \theta = \lambda$	*m*
Radius of central bright region formed by image of convex lens	$r = \frac{1.22 f\lambda}{2a} = \frac{0.16 f\lambda}{a}$	*m*

Frensel Distance	$Z = \frac{a^2}{\lambda}$	***m***
Polarisation Vs λ	$K = \frac{2\pi}{\lambda}$	***m***
Intensity due to two polaroids	$I = I_0 \text{Cos}^2\theta$	***Lumen***
Brewster's Angle	$\mu = \frac{Sin\ i_B}{Cos\ r} = \frac{Sin\ i_B}{Cos(\frac{\pi}{2} - i_B)} = tan i_B$	°