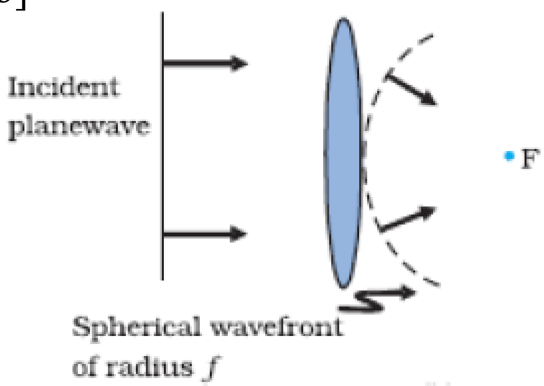
INDIAN SCHOOL AL WADI AL KABIR
FIRST PRELIMINARY EXAM 2020- '21

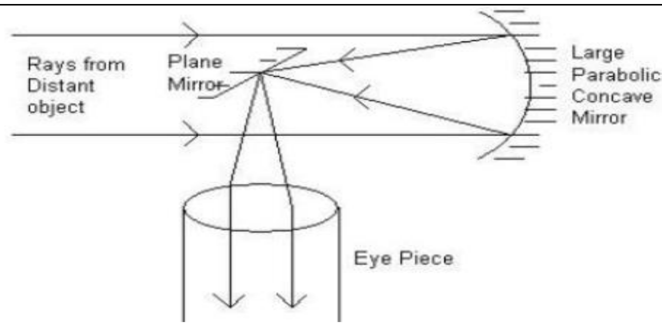
Sr.No.	MARKING SCHEME	Marks
	Section – A **All questions are compulsory. In case of internal choices, attempt any one of them.**	
[1]	[magnetic flux]	1
[2]	[microwave] **OR** $C = \frac{1}{\sqrt{\mu_o \varepsilon_o}}$	1
[3]	qE = qVB or $V = \frac{E}{B}$	1
[4]	$Vd^1 = 4Vd$ **OR** Manganin	1
[5]	The ground state energy of hydrogen atom is – 13.6 eV. What are the kinetic and potential energies of the electron in this state? K.E = 13.6 eV and P.E =-27.2Ev	½ + 1/2
[6]	α	1

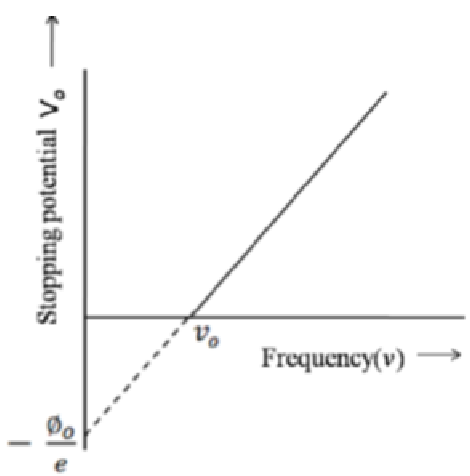
[7]	1.227A^o	1
[8]	brightness decreases **<u>OR</u>** Zero	1
[9]	[Violet]	1
[10]	L1- objective , L3- eye piece **<u>OR</u>** [ii] I = a^2	½ + 1/2
[11]	[A]	1
[12]	[C]	1
[13]	[A]	1
[14]	[C]	1
[15]	[1] b angle of incidence is greater than critical angle [2]b more than the refractive index of cladding [3]a There is no loss of intensity of light in reflecting prism	4

	[4]a 1.05 [5]a 28^0	
[16]	[1] [c] A hollow metal box [2] [b] electrostatic shielding [3] [d] electric field, E = 0, Potential V = constant [4] [b] $\frac{-q}{4\pi r_1^2}$ [5] [c] $\frac{Q+q}{4\pi r_2^2}$	4
[17]	A charged particle having a charge of 2nC moving in a magnetic field B with a velocity $\vec{v} = 10^5\hat{\imath}$ m/s experiences a magnetic force $\vec{F} = 2\ x\ 10^5\ [-\hat{\jmath}]$ N . Find the direction and magnitude of the magnetic field. $\vec{F} = q(\vec{v} \times \vec{B})$ ---- [1/2] 2 x 10^{-5} –j = q[10^5 I x B] ------[1/2] B is acting along the + z axis ----[1/2] F = qVB sinθ [½] Or B = 0.1T ---[1/2]	2
[18]	[a] no change [1] For writing the formula alone and final answer is wrong θ $= \frac{\beta}{d}$ or $\frac{\lambda}{d}$ [1/2] [b] no change [1]	2

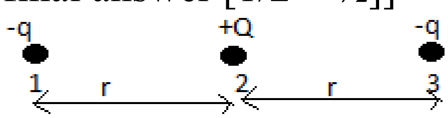
	OR [a] definition of wave front [1] [b]  [1/2 + ½]	
[19]	Derivation capacitor Figure [1/2] steps [1/2 + ½] final expression [1/2] any one expression **OR** [a] Definition equipotential surface [1] [b] Potential is inversely proportional to the distance[1]	2
[20]		2

	$(\phi_B)_{initial} = NBA\cos\theta$ $= 500 \times (3.0 \times 10^{-5} \times \pi \times 10^{-2} \cos 0^0) Wb$ $= 1.5\,\pi \times 10^{-4} Wb$ [1/2] $(\phi_B)_{final} = 500 \times (3.0 \times 10^{-5} \times \pi \times 10^{-2} \cos 180^0)\ Wb$ $= -1.5\pi \times 10^{-4}\ Wb$ [1/2] Induced emf $e = -\frac{d\varphi}{dt}$ [1/2] $= \frac{3\pi \times 10^{-4}}{0.25} V \simeq 3.8 \times 10^{-3} V$ =3.8mV [1/2]	
[21]	Total path difference = $\frac{xd}{D} + \frac{\lambda}{4}$ [1/2] For constructive interference $\frac{xd}{D} + \frac{\lambda}{4} = n\lambda$ ---[1/2] or $x = [\, n - \frac{1}{4}\,] \frac{D\lambda}{d}$ [1/2] X1 $= [1 - \frac{1}{4}] \frac{D\lambda}{d} = \frac{3D\lambda}{4d}$ X2 $= [2 - \frac{1}{4}] \frac{D\lambda}{d} = \frac{7D\lambda}{4d}$ X2 – X1 = $\frac{D\lambda}{d} = \beta$ [1/2]	2
[22]	BH = BE cosI [1/2] 0.4×10^{-4} = BE cos60or BE = 0.8×10^{-4}T[½ + ½ + 1/2] **OR** [a] Definition angle of dip [1/2] [b]Figure [1/2] Step [1/2] Tan I = $\frac{BV}{BH}$ [1/2]	2

[23]	 [1] As reflecting telescope has mirror objective, the image formed is free from chromatic aberration. [1]	2
[24]	[a] labelled diagram of moving coil galvanometer[½ + ½ + ½] [b] significance of radial magnetic field - linear scale [1/2]	2
[25]	[i] principle [1/2] [ii] [½ + ½ + ½]	2
[26]	E1 = $-\frac{d\emptyset}{dt}$ or $-\frac{dBA}{dt}$ or $-A[\frac{1-0}{2-0}]$ –[1/2] E1 = - [2.25 x 10^{-2}]volt [1/2] E2 = $-\frac{d\emptyset}{dt}$ or $-\frac{dBA}{dt}$ or $-A[\frac{1-1}{4-2}]$ [1/2] = 0 volt [1/2] E3 = $-\frac{d\emptyset}{dt}$ or $-\frac{dBA}{dt}$ or $-A[\frac{0-1}{6-4}]$ [1/2] E3 = 2.25 x 10^{-2} v [1/2]	3

[27]	[a] E = $\{\frac{E1}{r1} + \frac{E2}{r2}\}$ x $\frac{r1r2}{r1+r2}$ [1/2+ ½} = 1.7V [1/2] r = $\frac{r1r2}{r1+r2}$ [½ + ½] = 0.12 ohm [1/2] **OR** [i] diagram [1/2] Steps [1/2 + ½ + ½]] Final result [1/2] [ii] zero temp. coefficient of resistance [1/2]	3
[28]	$hv = \emptyset_o + eV_o$ [1]  [1/2 + ½]] work function = -(e × intercept on the y-axis) Planek's constant = e × slope of the curve. [1/2 + ½] **OR** [a] Definition 'threshold frequency' [1]	3

	$K_{max} = hf - W_0$ $\frac{1}{2}mv_1^2 = 2hf - hf = hf$ [1/2] $\frac{1}{2}mv_2^2 = 5hf - hf = 4hf$ [1/2] $\therefore \frac{v_1^2}{v_2^2} = \frac{1}{4}$ [1/2] $\Rightarrow \frac{v_1}{v_2} = \frac{1}{2}$ [1/2]	
[29]	Diagram [1/2] Steps [1/2 + ½ + ½ + ½] final answer [1/2]	3
[30]	[a] Labelled diagram [1/2] Electromagnetic induction / mutual induction [1/2] Working[1/2] [b]steps [1/2+ 1/2] Final result [1/2]	3
[31]	Diagram [1/2 + ½] Steps [1/2 + ½ + ½ + ½ +1/2 +1/2 + ½] final answer [1/2] **<u>OR</u>** [a] Diagram [1/2 + ½] Steps [1/2 + ½ + ½ + ½] final answer [1/2 + ½]] [b] Graph [1/2] These become weaker with increasing n, since only one-fifth, one-seventh, etc. of the slit contributes the intensity [1/2]	5

[32]	basic principle [1/2] derivation steps = ½ + ½ + ½] labelled diagram – [1/2 + ½] working – [½ + ½ + ½ + 1/2]] OR [a] impedance [1/2] Circuit diagram [1/2] phasor diagram [1/2] derivation steps [½ + 12 + ½ + 1/2] final result [1/2] [c] expression for phase angle 'Φ' Step [1/2] Final result [1/2]	5
[33]	Diagram [1/2 + ½] Steps [1/2 + ½ + ½] final answer [1/2 + ½]] F1= 2 x 10^{-8} x 3.6 x 10^{8} = 7.2N [1/2] F2 = 2 x 10^{-8} x 3.27 x 10^{8} = 6.54 N [1/2] Net force = 7.2 – 6.54 = 0.66N [1/2] **OR** [a] Diagram [1/2 + ½] Steps [1/2 + ½ + ½] final answer [1/2 + ½]]  U = $\frac{Kq1\,q2}{r12} + \frac{K\,q2\,q3}{r23} + \frac{Kq3\,q1}{r31}$ = 0 [1/2] U = $\frac{-Kq\,x{+}Q}{r} + \frac{K\,Q\,x{-}q}{r} + \frac{K{-}q\,x{-}q}{2r}$ = 0 [1/2] Q/q = ¼ [1/2]	5