INDIAN SCHOOL MUSCAT

SECOND PRE-BOARD EXAMINATION

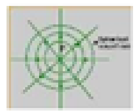
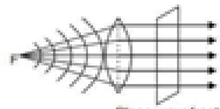
SET C

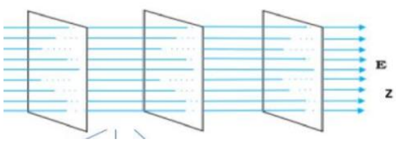
APRIL 2021

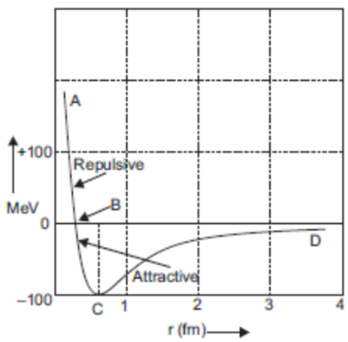
CLASS XII

Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	1:1	1
2.	Pole strength	1
3.	(i)Decreases (ii) increases	1
4.	n type OR p type	½ + ½
5.	X rays OR $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$	1
6.	1:1	1
7.	(i)Decreases (ii) increases OR 300 V	1
8.	Boron /Cadmium OR 1:2	1
9.	Helical path	½ + ½
10.	Metal A. Explanation	½ + ½
11.	a	
12.	d	
13.	d	
14.	a	
15.	(1) c (2) d (3) c (4) a (5) a	
16.	(1) b (2) a (3) b (4) a (5) d	
17.	(a) Photodiode used in reverse bias – reason (b) Distinguish between n type and p type – two points	1 ½ + ½

18.	Figure Derivation- (Snell's law on the basis of Huygen's wave theory when light is travelling from a denser to a rarer medium.) OR (i)  (ii)  	1 1 1 1
19	b) i) The soft iron coil in a galvanometer will make the field radial. Also, it increases the strength of the magnetic field. ii) Current sensitivity in the galvanometer is given by, $\frac{\theta}{I} = \frac{NBA}{k}$ Voltage sensitivity in the galvanometer is given by, $\frac{\theta}{V} = \frac{\theta}{IR} = \left(\frac{nBA}{k}\right).\frac{1}{R}$ The above two equations imply that increasing the current sensitivity may not necessarily increase the voltage sensitivity.	1 1
20.	a) When screen is moved away, D increases. As $\beta=\lambda D/d$ therefore width of the fringes increases. (b) If s is size of the source and S is distant of source from the plane of the two slits, then for interference fringes to seen, the condition is $s/S<\lambda/D$ As source slit is brought closer to double slit plane, S decreases, the interference pattern gets less and less sharp. When the source is too close, the fringe separation remains fixed.	1 1
21.	Fig and showing current leads voltage in pure capacitive circuit If $V = V_0 \sin \omega t$ $q = CV = CV_0 \sin \omega t$ $\therefore \quad I = \frac{dq}{dt} = \omega CV_0 \cos \omega t$ or $I = \omega CV_0 \sin (\omega t + \frac{\pi}{2})$	½ 1 ½

22.	(a) Since the capacitors are connected in parallel we have, $\boxed{C = C_1 + C_2 + C_3}$ $= (2+3+4) \times 10^{-12}$ $= 9 \times 10^{-12} = 9\ \text{pF}$ (b) $q_1 = C_1V$ $= 2 \times 10^{-12} \times 100$ $= 2 \times 10^{-10}\ \text{C}$ $q_2 = C_2V$ $= 3 \times 10^{-12} \times 100$ $= 3 \times 10^{-10}\text{C}$ $q_3 = C_3V$ $= 4 \times 10^{-12} \times 100$ $= 4 \times 10^{-10}\text{C}$ OR (a)  (b) Yes. Electric potential is zero at all points on equatorial line of electric dipole ,while electric field is non zero. (or any correct example)	½ 1 ½
23.	Diagram of full wave rectifier i/p and o/p wave forms	1 ½ + ½
24.	Three elements of earth's magnetic field At the poles OR definition – angle of dip (a) poles (b) equator	1 ½ ½ 1 ½ ½
25.	Fringe width $\beta=\lambda D/d$ $= 5 \times 10^{-4}\ \text{m}$	1 1
	SECTION C	
26.	Definition – self inductance Derivation – energy stored in an inductor	1 2
27.	Cells in parallel – expression for emf and resistance OR	3

	(a) constantan and manganin are used for making standard resistors (b) connections between resistors in a meter bridge made of thick copper strips (c) the balance point is obtained near the middle of the bridge wire in meter bridge experiments	1 1 1
28.	(i) metal Q (ii) $E = h\vartheta_0 = 6.63\, x 10^{-34} x\ 6x10^{14} = 3.97x\ 10^{-19} J$ (iii)no change	1 1 1
29	 Marking regions	2 1
30.	At the distance of nearest approach PE = KE $\frac{k(ze)(2e)}{r_0} = 4.5\ \text{MeV} = 4.5 \times 10^6 \times 1.6 \times 10^{-19} J$ $r_0 = \frac{k(ze)(2e)}{4.5 \times 1.6 \times 10^{-13}}$ $= \frac{9 \times 10^9 \times (80) \times 2 \times (1.6 \times 10^{-19})^2}{4.5 \times 1.6 \times 10^{-13}} = 51.2 \times 10^{-15} m.$	1 2
31.	a) Faraday’s law of electromagnetic induction- statement and mathematical expression (b)Deducing an expression for the emf induced in the rod with figure (c) expression for current induced in it. Or working of a step up transformer, with diagram. expression for the secondary to primary voltage in terms of the number of turns in the two coil. any two sources of energy loss in a transformer	2 2 1 1 ½ 2 ½ 1

32.	(a) Gauss's law statement (b) the expression for electric field due to an infinitely long straight thin charged wire with diagram Graph showing the variation of E with r OR (a) Definition electric dipole moment . SI unit. (b) Diagrammatic representation of the position of dipole in stable and unstable equilibrium writing the expression for the torque acting on the dipole and potential energy of dipole in both the cases	1 ½ 2 ½ 1 1 1 1 2
33.	coherent sources of light -definition two conditions for sustained interference pattern. expression for the width of interference fringes(YDS) with diagram OR Lens maker formula derivation… Fig – Derivation	1 1 2 2 3