INDIAN SCHOOL MUSCAT

FIRST PRE- BOARD EXAMINATION

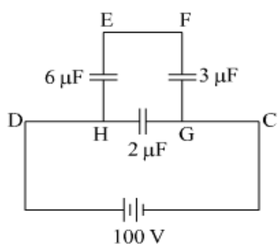
SET A

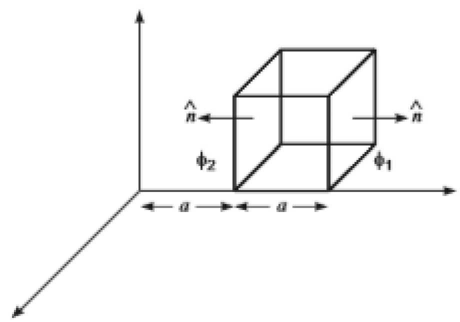
JANUARY 2020

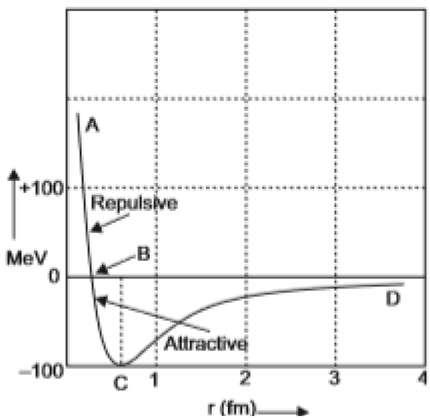
CLASS XII

Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	(c)	1
2.	(d)	1
3.	(C)	1
4.	(b)	1
5.	(c)	1
6.	(b)	1
7.	(b)	1
8.	(d)	1
9.	(a)	1
10.	(d)	1
11.	Paramagnetic substance	1
12.	Radial	1
13.	Angle of dip	1
14.	Negative OR Scattering	1
15.	Becquerel	1
16.	Neutrinos are mass less, have no charge and do not interact with matter	1
17.	By using laminated core	1
18.	Decreases OR Definition of barrier potential	1

19.	Statement of Ampere's circuital Law OR Statement Biot-Savart law.	1
20.	$P = V_{rms}$ x I_{rms} x $\cos \pi/2 = 0$	1
21.	As the both 3 uF capacitors are connected in parallel, so net capacitance between branch EH = 3+3=6 μF Similarly, capacitance 2 uF and 1 uF at the corner B are also connected in parallel, so the net capacitance of branch FG = 2+1=3 μF If reconstruct the given figure according to the above calculations, we can see that 6 μF capacitor and 3 μF capacitor ar connected in series and another 2 uF capacitor is connected in parallel with both of them.  Hence net capacitance Between D and C = 2+3×63+6=2+2=4 μF The total capacitance of the circuit, Cnet = 4 μF Total voltage applied, *V* = 100 V Energy stored in the network = 12CnetV2=12×4×10-6×(100)2=0.02 J	1 1
22.	Principle of potentiometer (i) By increasing the total length of wire, keeping terminal voltage constant (ii) By connecting a suitable extra resistance R in series with potentiometer. So, less amount of the current flows through the potentiometer wire.	1 ½ ½
23.	$r_\alpha / r_p = 2/1$ with calculation OR Paramagnetic material Diagram of magnetic lines through Paramagnetic material	2 1 1
24.	(a) two conditions of TIR (b) $n = 1/\sin i_c$	1 1
25.	Statement of Brewster's law Since refractive index is different for different colour, Brewster's angle is different for different colours.	1 1
26.	(a) Saturation or short range nature of nuclear forces. (b) To show that the density of nucleus over wide range of nuclei is constant independent of mass number **A**.	1 1

	OR λ_{min} = 8.18 x 10^{-7}m after calculation IR region	1½ ½
27.	Energy band diagram of n-type and p-type semiconductor with marking of donor and acceptor level	½ ½ ½ ½
28.	(*i*) Gauss's Law in electrostatics states that the total electric flux through a closed surface enclosing a charge is equal to $\frac{1}{\varepsilon_0}$ times the magnitude of that charge. $\phi = \oint_s \vec{E}.\vec{dS} = \frac{q}{\varepsilon_0}$  (*ii*) Net flux $\phi = \phi_1 + \phi_2$ where $\phi_1 = \vec{E}.\vec{dS}$ $= 2aC\, dS \cos 0° = 2aC \times a^2 = 2a^3C$ $\phi_2 = aC \times a^2 \cos 180° = -a^3C$ $\phi = 2a^3C + (-a^3C) = a^3C\ \mathrm{Nm^2\ C^{-1}}$ (*iii*) Net charge $(q) = \varepsilon_0 \times \phi = a^3C\varepsilon_0$ coulomb $q = a^3C\ \varepsilon_0$ coulomb.	½ 2 ½
29.	Moving coil galvanometer: Diagram Principle working cylindrical soft iron core inside the coil of a galvanometer makes the magnetic field stronger OR When electron revolves around a nucleus, it creates circular current around it. In this way, it is equivalent to a current carrying coil. So, it behaves as a tiny magnetic dipole Derivation of **μ = - (e/2m$_e$) L** Negative sign indicates **μ** is opposite to **L**	½ ½ 1½ ½ ½ 2 ½
30.	In RC circuit: Phasor diagram (a) impedence (b) Phase angle OR Explanation of mutual inductance Expression of mutual inductance for two concentric circular coils	1 1 1 1 2
31.	(a) X-rays (b) secondary emission of radiation when high energy electrons strike on high atomic no metal (c) wavelength from 1 x10^{-11} m to 1 x10^{-8} m	1 1 1
32.	v_e = infinity so image formed by objective lens at focus of eye piece $L = v_0 + f_e$	½

	using lens formula for objective lens	
	$v_0 = 2.5$ cm	2
	L = 2.5 + 5 = 7.5 cm	½
33.	(a) Zener diode-	
	Circuit	1
	Working	2
	(b) Two advantages of using LEDs over conventional incandescent lamps.	½ ½
34.	Part *AB* represents repulsive force and Part *BCD* represents attractive force.	1
		
	Conclusions:	1
	(1) Nuclear forces are attractive and stronger, then electrostatic force.	1
	(2) Nuclear forces are charge-independent.	
35.	(a) Electric **E** due to a dipole on the axial line.	
	Diagram	½
	Derivation	1½
	(b) Graph of **E** versus **r**	1
	(c) Diagrammatically represent the position of the dipole in stable and unstable equilibrium	
	stable equilibrium $\theta = 0^0$ and $\tau = 0$ along with diagram	½ ½
	unstable equilibrium $\theta = 180^0$ and $\tau = 0$ along with diagram	½ ½
	OR	
	(a) Definition of the drift velocity and relaxation time.	½ ½
	(b) On the basis of electron drift, derivation for resistivity in terms of number density of free electrons and relaxation time.	3
	(c) Constantan and manganin are used for making standard resistors because alloys have high resistivity negligible temperature coefficient resistance	1
36.	(a) Deduce the expression for the refractive index of glass of prism	
	Diagram	1
	Derivation	2

	(b) Ray diagram showing the formation of image by a reflecting type telescope. **OR** (a) Young's double slit experiment Diagram Derivation of fringe width (b) Any two characteristic features which distinguish between interference and diffraction phenomena.	2 ½ 2½ 1,1
37.	(a) Derivation of Einstein's photoelectric equation on photon picture Two features of photoelectric effect which cannot be explained by wave theory. (b) A proton and **α-** particle have the same de-Broglie wavelength. Determine the ratio of their accelerating potentials. $V = h^2/2mq\lambda^2$ $V_p/ V_\alpha = 4m \times 2q/ mq = 8/1$ OR Derivation of energy of revolving electron in orbit $E_n = - Ze^2/8\pi\varepsilon_0 r_n$ Using Bohr postulate final expression of energy $E_n = - mZ^2 e^4/8\varepsilon_0^2 h^2 n^2$ then after substituting Rydberg constant $E_n = -Rch/n^2$ For Balmer series $1/\lambda = Rc\ (1/n_f - 1/n_i)$ where $n_f = 2$ and $n_i = 3,4,5,\ldots\ldots$..infinity Energy level diagram	2 ½ ½ ½ 1½ 3 2