INDIAN SCHOOL MUSCAT

FIRST PRE- BOARD EXAMINATION

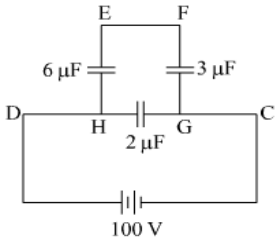
SET C

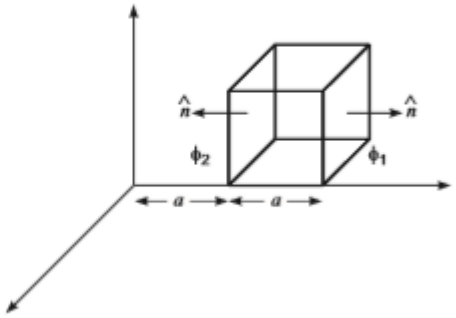
JANUARY 2020

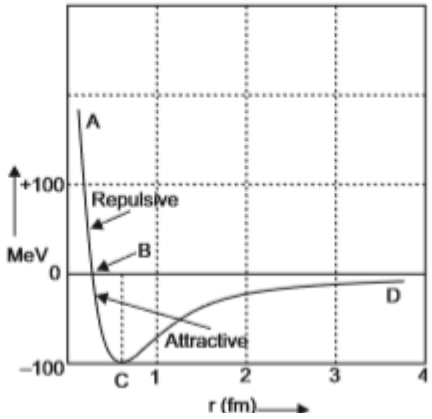
CLASS XII

Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	(d)	1
2.	(c)	1
3.	(d)	1
4.	(b)	1
5.	(c)	1
6.	(b)	1
7.	(b)	1
8.	(d)	1
9.	(a)	1
10.	(c)	1
11.	Angle of dip	1
12.	Radial	1
13.	Paramagnetic substance	1
14.	Negative OR Scattering	1
15.	Becquerel	1
16.	Statement of Ampere's circuital Law	1
17.	By using laminated core	1
18.	Decreases OR Definition of barrier potential	1

19.	Neutrinos are mass less, have no charge and do not interact with matter	1
20.	$P = V_{rms} \times I_{rms} \times \cos \pi/2 = 0$	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 a 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_{α}/ r_p = 2/1 with calculation OR Paramagnetic material Diagram of magnetic lines through Paramagnetic material	2 1 1
24.	(a) State the principle on which the working of an optical fibre is based. (b) What are the necessary conditions for this phenomenon to occur?	1 ½ ½
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**. OR	1 1

	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	½ ½ 1½ 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) Microwaves Production: Klystron/ Magnetron/Gunn diode (b) IR Production: Hot bodies/ Vibrations of atoms and molecule (c) X –rays Production: secondary emission of radiation when high energy electrons strike on high atomic no metal	1 1 1
32.	v_e = infinity so image formed by objective lens at focus of eye piece $L = v_0 + f_e$ using lens formula for objective lens v_0 = 2.5 cm L = 2.5 + 5 = 7.5 cm	½ 2 ½

33.	(a) Zener diode- Circuit Working (b) Two advantages of using LEDs over conventional incandescent lamps.	 1 2 ½ ½
34.	Part *AB* represents repulsive force and Part *BCD* represents attractive force.  **Conclusions:** (1) Nuclear forces are attractive and stronger, then electrostatic force. (2) Nuclear forces are charge-independent.	1 1 1
35.	(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 $n_i = 3,4,5,$…….infinity Energy level diagram	2 ½ ½ ½ 1½ 3 2
36.	(a) Electric **E** due to a dipole on the axial line. Diagram Derivation (b) Graph of **E** versus **r**	 ½ 1½ 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 unstable equilibrium $\theta = 180^0$ and $\tau = 0$ along with diagram OR (a) Definition of the drift velocity and relaxation time. (b) On the basis of electron drift, derivation for resistivity in terms of number density of free electrons and relaxation time. (c) Constantan and manganin are used for making standard resistors because alloys have high resistivity negligible temperature coefficient resistance	½ ½ ½ ½ ½ ½ 3 1
37.	a) Deduce the expression for the refractive index of glass of prism Diagram Derivation (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.	½ 2½ 2 ½ 2½ 1,1