INDIAN SCHOOL MUSCAT

FIRST PRE- BOARD EXAMINATION

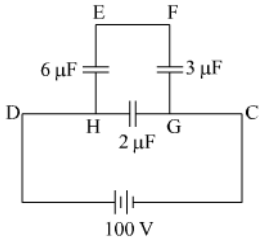
JANUARY 2020

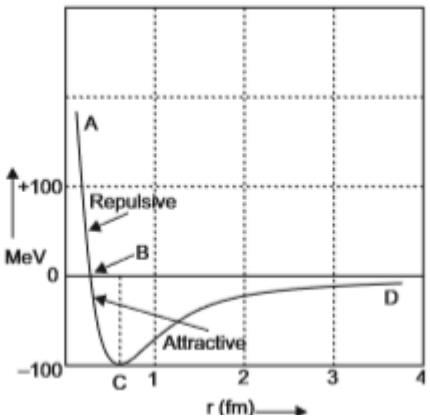
SET B

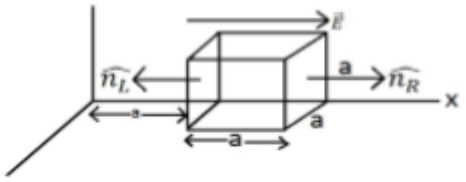
CLASS XII

Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	(c)	1
2.	(b)	1
3.	(C)	1
4.	(d)	1
5.	(c)	1
6.	(d)	1
7.	(a)	1
8.	(d)	1
9.	(b)	1
10.	(b)	1
11.	Becquerel	1
12.	Paramagnetic substance	1
13.	Radial	1
14.	Angle of dip	1
15.	Negative OR Scattering	1
16.	By using laminated core	1
17.	Neutrinos are mass less, have no charge and do not interact with matter	1
18.	$P = V_{rms} \times I_{rms} \times \cos \pi/2 = 0$	1
19.	Statement Biot-Savart law.	1

20.	Increases OR More absorption coefficient	1
21.	 Statement of Brewster's law Since refractive index is different for different colour, Brewster's angle is different for different colours.	 1 1
22.	(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 λ_{min} = 8.18 x 10^{-7}m after calculation IR region	1 1 1½ ½
23.	 Two points of difference between intrinsic and extrinsic semiconductors.	 1,1
24.	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 are 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
25.	Balance conditions in a Wheatstone bridge by using Kirchhoff's rules Circuit Condition	 1 1
26.	r_a / r_p = ½ with calculation OR Paramagnetic material Diagram of magnetic lines through Paramagnetic materia	2 1 1

27.	(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?	½ ½ ½ ½
28.	Moving coil galvanometer: Diagram Principle working cylindrical soft iron core inside the coil of a galvanometer makes the magnetic field stronger	 ½ ½ 1½
29.	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
30.	a) Zener diode- Circuit Working (b) Two advantages of using LEDs over conventional incandescent lamps.	 1 1 ½ ½
31.	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 ½ ½

32.	 $\because E_x = \propto x = 400x$ $E_y = E_z = 0$ Hence flux will exist only on left and right faces of cube as $E_x \neq 0$ $\because \overrightarrow{E_L} \cdot a^2(\widehat{n_2}) + \overrightarrow{E_R} \cdot a^2\widehat{n_R} = \frac{1}{\epsilon_0}\{qin\} = \phi$ $-E_L \cdot a^2(\widehat{n_2}) + a^2 E_R = \phi_{Net}$ $\phi_{Net} = -(400a)a^2 + a^2(400 \times 2a)$ $= -400a^3 + 800a^3$ $= 400a^3$ $= 400 \times (.1)^3$ $\phi_{Net} = 0.4\ Nm^2c^{-1}$ $\because \phi_{Net} = \frac{1}{\epsilon_0}\{qin\}$ $\therefore qin = \epsilon 0 \phi_{Net}$ $= 8.85 \times 10^{-12} \times 0.4$ $= 3.540 \times 10^{-12} c$	2 1
33.	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 ½ 2½
34.	(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	 ½ ½ ½ ½ ½ ½
35.	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	 ½ 2½ ½ 2½ 1,1

	phenomena.	
36.	(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
37.	(a) Electric **E** due to a dipole on the axial line. Diagram Derivation (b) Graph of **E** versus **r** (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 2½ 1 ½ ½ ½ ½ ½ ½ 3 1