

**KENDRIYA VIDYALAYA SANGATHAN**

**Class: XII      SESSION - 2022-2023**

**SAMPLE QUESTION PAPER (THEORY) FOR PRACTICE**

**SUBJECT: PHYSICS**

**Maximum Marks: 70 Marks**  
**hours.**

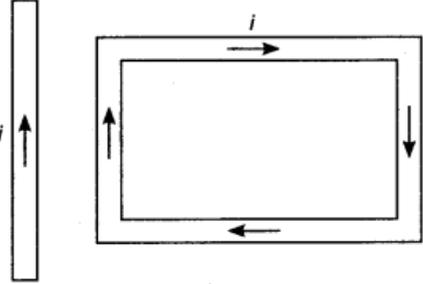
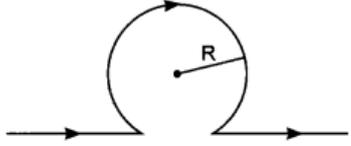
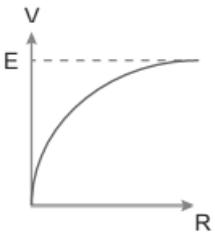
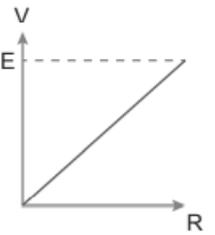
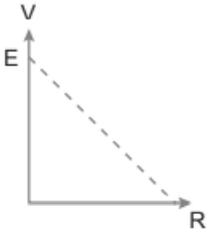
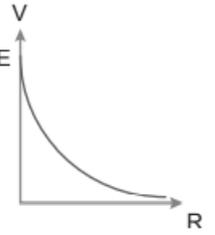
**Time Allowed: 3**

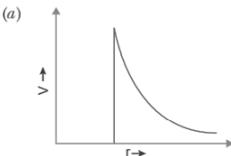
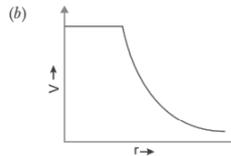
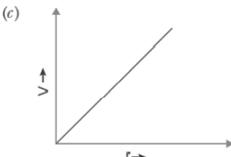
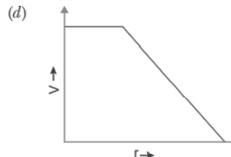
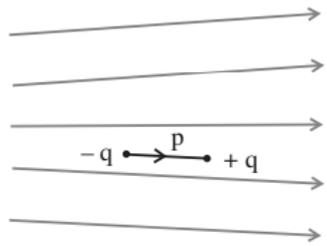
**General Instructions:**

- (1) There are **35 questions** in all. All questions are compulsory
- (2) This question paper has five sections: **Section A, Section B, Section C, Section D and Section E.**  
All the sections are compulsory.
- (3) **Section A** contains **eighteen MCQ of 1 mark** each, **Section B** contains **seven questions of two marks** each, **Section C** contains **five questions of three marks** each, **section D** contains **three long questions of five marks** each and **Section E** contains **two case study-based** questions of **4 marks** each.
- (4) There is **no overall choice**. However, **an internal choice** has been provided in section B, C, D and E. You have to attempt only one of the choices in such questions.
- (5) Use of calculators is not allowed.

**SECTION A**

Q. No.		MARKS
1	On rubbing, when one body gets positively charged and other negatively charged, the electrons transferred from positively charged body to negatively charged body are (a) valence electrons only (b) electrons of inner shells (c) both valence electrons and electrons of inner shell (d) yet to be established	1
2	Electric lines of force about a negative point charge are (a) circular anticlockwise (b) circular clockwise (c) radial, inwards (d) radial, outwards	1
3	When a potential difference $V$ is applied across a conductor at a temperature $T$ , the drift velocity of electrons is proportional to (a) $\sqrt{V}$ (b) $V$ (c) $\sqrt{T}$ (d) $T$	1

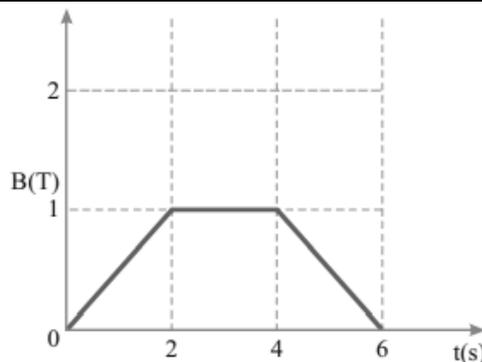
4	<p>A rectangular loop carrying a current <math>i</math> is situated near a long straight wire such that the wire is parallel to the one of the sides of the loop and is in the plane of the loop. If a steady current <math>I</math> is established in wire as shown in figure, the loop will</p> <p>(a) rotate about an axis parallel to the wire.            (b) move away from the wire or towards right.            (c) move towards the wire.            (d) remain stationary.</p>		1
5	<p>The strength of magnetic field at the centre of circular coil is</p> <p>(a) <math>\frac{\mu_0 I}{R} \left(1 - \frac{1}{\pi}\right)</math>      (b) <math>\frac{\mu_0 I}{\pi R}</math>            (c) <math>\frac{\mu_0 I}{2R} \left(1 - \frac{1}{\pi}\right)</math>      (d) <math>\frac{\mu_0 I}{2R} \left(1 + \frac{1}{\pi}\right)</math></p>		1
6	<p>A cell of emf <math>E</math> and internal resistance <math>r</math> is connected across an external resistor <math>R</math>. The graph showing the variation of P.D. across <math>R</math> versus <math>R</math> is</p> <p>(a)       (b) </p> <p>(c)       (d) </p>		1
7	<p>If a conducting wire carries a direct current through it, the magnetic field associated with the current will be _____</p> <p>(a) both inside and outside the conductor            (b) neither inside nor outside the conductor            (c) only outside the conductor            (d) only inside the conductor</p>		1
8	<p>Out of the following options which one can be used to produce a propagating electromagnetic wave?</p> <p>(a) A chargeless particles            (b) An accelerating charge            (c) A charge moving at constant velocity            (d) A stationary charge</p>		1

9	<p>If an electron and a photon propagate in the form of waves having same wavelength, it implies that they have same: (a)</p> <p>speed          (b) momentum          (c) energy          (d) all the above</p>	1
10	<p>In a Young's double-slit experiment the fringe width is found to be 0.4 mm. If the whole apparatus is dipped in water of refractive index <math>4/3</math>, without disturbing the arrangement, the new fringe width will be</p> <p>(a) 0.30 mm          (b) 0.40 mm          (c) 0.53 mm          (d) 0.2 mm</p>	1
11	<p>When an electron in an atom goes from a lower to a higher orbit, its</p> <p>(a) kinetic energy (KE) increases, potential energy (PE) decreases          (b) KE increases, PE increases          (c) KE decreases, PE increases          (d) KE decreases, PE decreases</p>	1
12	<p>A magnet is dropped with its north pole towards a closed circular coil placed on a table then</p> <p>(a) looking from above, the induced current in the coil will be anti-clockwise.          (b) the magnet will fall with uniform acceleration.          (c) as the magnet falls, its acceleration will be reduced.          (d) no current will be induced in the coil</p>	1
13	<p>When a nucleus in an atom undergoes a radioactive decay, the electronic energy levels of the atom</p> <p>(a) do not change for any type of radioactivity.          (b) change for <math>\alpha</math> and <math>\beta</math> radioactivity but not for <math>\gamma</math>-radioactivity.          (c) change for <math>\alpha</math>-radioactivity but not for others.          (d) change for <math>\beta</math>-radioactivity but not for others.</p>	1
14	<p>In the case of a charged metallic sphere, potential (V) changes with respect to distance (r) from the centre as</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(a)</p>  </div> <div style="text-align: center;"> <p>(b)</p>  </div> <div style="text-align: center;"> <p>(c)</p>  </div> <div style="text-align: center;"> <p>(d)</p>  </div> </div>	1
15	<p>Figure shows electric field lines in which an electric dipole p is placed as shown. Which of the following statements is correct?</p> <p>(a) the dipole will not experience any force.          (b) the dipole will experience a force towards right.          (c) the dipole will experience a force towards left.          (d) the dipole will experience a force upward</p> <div style="text-align: right;">  </div>	1

16	<p>Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.</p> <p>(a) Both A and R are true and R is the correct explanation of A  (b) Both A and R are true and R is NOT the correct explanation of A  (c) A is true but R is false  (d) A is false and R is also false</p> <p><b>Assertion:</b> <math>\vec{E} = \rho \vec{j}</math> is the statement of Ohm's law.  <b>Reason:</b> If the resistivity of the conducting material is independent of the direction and magnitude of applied field then the material obeys Ohm's law.</p>	1
17	<p>Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.</p> <p>(a) Both A and R are true and R is the correct explanation of A  (b) Both A and R are true and R is NOT the correct explanation of A  (c) A is true but R is false  (d) A is false and R is also false</p> <p><b>Assertion:</b> The image formed by a concave mirror is certainly real if the object is virtual  <b>Reason:</b> The image formed by a concave mirror is certainly virtual if the object is real.</p>	1
18	<p>Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.</p> <p>(a) Both A and R are true and R is the correct explanation of A  (b) Both A and R are true and R is NOT the correct explanation of A  (c) A is true but R is false  (d) A is false and R is also false</p> <p><b>Assertion:</b> In process of photoelectric emission, all emitted electrons do not have same kinetic energy.  <b>Reason:</b> If radiation falling on photosensitive surface of a metal consists of different wavelength, then energy acquired by electrons absorbing photons of different wavelengths shall be different</p>	1

## SECTION B

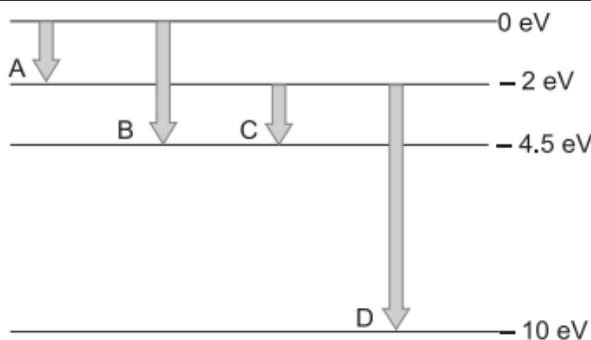
19	<p>For a plane electromagnetic wave, propagating along the z-axis, write the two (possible) pairs of expressions for its oscillating electric and magnetic fields. How are the peak values of these (oscillating) fields related to each other?</p>	2
20	<p>The magnetic field through a circular loop of wire 12 cm in radius and <math>8.5 \Omega</math> resistance, changes with time as shown in the figure. The magnetic field is perpendicular to the plane of the loop. Calculate the induced current in the loop and plot it as a function of time.</p>	2



21	Write three characteristic features in photoelectric effect which cannot be explained on the basis of wave theory of light, but can be explained only using Einstein's equation. <b>OR</b> What is meant by work function of a metal? How does the value of work function influence the kinetic energy of electrons liberated during photoelectron emission?	2
22	The radii of curvature of both the surfaces of a lens are equal. If one of the surfaces is made plane by grinding, then will the focal length of lens change? Will the power change?	2
23	Distinguish between a metal and an insulator on the basis of energy band diagrams <b>OR</b> Write two characteristic features to distinguish between n-type and p-type semiconductors.	2
24	What is the shape of the wavefront in each of the following cases: (a) light diverging from a point source. (b) light emerging out of a convex lens when a point source is placed at its focus.	2
25	Plot a graph comparing the variation of potential 'V' and electric field 'E' due to a point charge 'Q' as a function of distance 'R' from the point charge.	2

### SECTION C

26	Write any two important points of similarities and differences each between Coulomb's law for the electrostatic field and Biot-Savart's law for the magnetic field.	3
27	The currents flowing in the two coils of self-inductance $L_1=16$ mH and $L_2=12$ mH are increasing at the same rate. If the power supplied to the two coils are equal, find the ratio of (i) induced voltages, (ii) the currents and (iii) the energies stored in the two coils at a given instant.	3
28	Show that the current leads the voltage in phase by $\pi/2$ in an ac circuit containing an ideal capacitor. <b>OR</b> In a series LCR circuit, obtain the conditions under which (i) the impedance of the circuit is minimum, and (ii) wattless current flows in the circuit.	3
29	A proton and an alpha particle are accelerated through the same potential. Which one of the two has (i) greater value of de Broglie wavelength associated with it and (ii) less kinetic energy? Give reasons to justify your answer <b>OR</b> A proton and a deuteron are accelerated through the same accelerating potential. Which one of the two has (i) greater value of de-Broglie wavelength associated with it, and (ii) less momentum? Give reasons to justify your answer	3
30	The energy levels of a hypothetical atom are shown alongside. Which of the shown transitions will result in the emission of a photon of wavelength 275 nm? Which of these transitions correspond to emission of radiation of (i) maximum and (ii) minimum wavelength?	3



## SECTION D

31	<p>A parallel plate capacitor is charged by a battery, which is then disconnected. A dielectric slab is then inserted in the space between the plates. Explain what changes, if any, occur in the values of</p> <p>(i) capacitance  (ii) potential difference between the plates  (iii) electric field between the plates, and  (iv) the energy stored in the capacitor.</p> <p style="text-align: center;">OR</p> <p>A parallel plate capacitor each with plate area <math>A</math> and separation '<math>d</math>' is charged to a potential difference <math>V</math>. The battery used to charge it is then disconnected. A dielectric slab of thickness <math>d</math> and dielectric constant <math>K</math> is now placed between the plates. What change if any, will take place in</p> <p>(i) charge on the plates,  (ii) electric field intensity between the plates,  (iii) capacitance of the capacitor?</p> <p>Justify your answer in each case.</p>	5
32	<p>Draw a circuit diagram showing balancing of Wheatstone bridge. Use Kirchhoff's rules to obtain the balance condition in terms of the resistances of four arms of Wheatstone Bridge</p> <p style="text-align: center;">OR</p> <p>Draw the circuit diagram of a potentiometer which can be used to determine the internal resistance of a given cell of emf (<math>E</math>). Describe a method to find the internal resistance of a primary cell.</p>	5
33	<p>A compound microscope uses an objective lens of focal length 4 cm and eyepiece lens of focal length 10 cm. An object is placed at 6 cm from the objective lens. Calculate the magnifying power of the compound microscope. Also calculate the length of the microscope</p> <p style="text-align: center;">OR</p> <p>A small telescope has an objective lens of focal length 150 cm and eyepiece of focal length 5 cm. What is the magnifying power of the telescope for viewing distant objects in normal adjustment?  If this telescope is used to view a 100 m tall tower 3 km away, what is the height of the image of the tower formed by the objective lens?</p>	5

## SECTION E

34	<p><b>Case Study:</b>  p-n junction is a single crystal of Ge or Si doped in such a manner that one half portion of it acts as p-type semiconductor and other half functions as n-type semiconductor. As soon as a p-n junction is formed, the holes from the p-region diffuse into the n-region and electron from n region diffuse in to p-region. This results in the development of <math>V</math>, across the junction which opposes the further diffusion of electrons and holes through the junction.</p> <p>(i) In an unbiased p-n junction why electrons diffuse from n-region to p-region? 1  (ii) After electron hole recombination in p-n junction what is emitted? 1  (iii) In an unbiased p-n junction, how is potential of p and n is related? 2</p> <p style="text-align: center;">OR</p> <p>(iii) What is the cause of formation of depletion layer? 2</p>	4
----	--	---

35	<p><b>Case Study:</b></p> <p>A prism is a portion of a transparent medium bounded by two plane faces inclined to each other at a suitable angle. A ray of light suffers two refractions on passing through a prism and hence deviates through a certain angle from its original path.</p> <p>The angle of deviation of a prism is, <math>\delta = (\mu - 1) A</math>, through which a ray deviates on passing through a thin prism of small refracting angle A.</p> <p>If <math>\mu</math> is refractive index of the material of the prism, then prism formula is,</p> $\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\frac{A}{2}}$ <p>(i) For which colour, angle of deviation is minimum? 1</p> <p>(ii) What is the angle of incidence for the maximum deviation? 1</p> <p>(iii) Name any two factors on which angle of deviation depends on? 2</p> <p style="text-align: center;">OR</p> <p>(iii) What is the deviation produced by a prism of angle <math>6^\circ</math>? (Refractive index of the material of the prism is 1.644). 2</p>	4
----	---	---