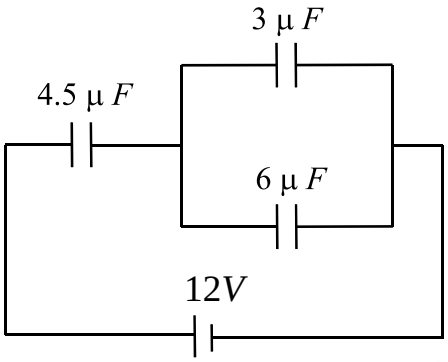
Sample Paper-01

Class 12th NEET (2024)

PHYSICS

SECTION-A

1. In the circuit shown in the figure, the potential difference across the 4.5μF capacitor is;



(1) $\frac{8}{3}$ volts (2) 4 volts

(3) 6 volts (4) 8 volts

2. 4-point charges each $+q$ is placed on the circumference of a circle of diameter $2d$ in such a way that they form a square. The potential at the centre is;

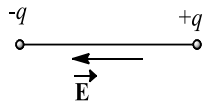
(1) 0 (2) $k\frac{4q}{d}$

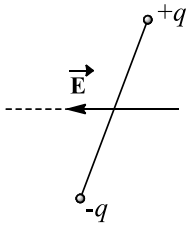
(3) $k\frac{4d}{q}$ (4) $k\frac{q}{4d}$

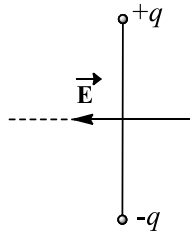
3. When a body is earth connected, electrons from the earth flow into the body. This means the body is;

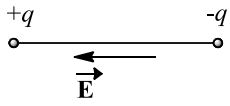
(1) Charged negatively
(2) An insulator
(3) Uncharged
(4) Charged positively

4. In which of the states shown in figure is the potential energy of a electric dipole maximum?

(1) 

(2) 

(3) 

(4) 

5. A dielectric of dielectric constant K is introduced such that half of its area of a capacitor of capacitance C is occupied by it. The new capacity is;

(1) $2C$ (2) $\frac{C}{2}$

(3) $\frac{(1+K)C}{2}$ (4) 2C (1 + K)

6. A hollow conducting sphere of radius R has a charge $(+Q)$ on its surface. What is the electric potential within the sphere at a distance $r=\frac{R}{3}$ from its centre?

(1) $\frac{3}{4\pi\varepsilon_0}.\frac{Q}{R}$ (2) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{\left(\frac{2R}{3}\right)}$

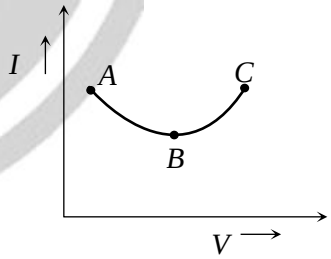
(3) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{R}$ (4) Zero

7. If current in an electric bulb changes by 1%, then the power will change by;

(1) 1% (2) 2%

(3) 4% (4) $\frac{1}{2}$%

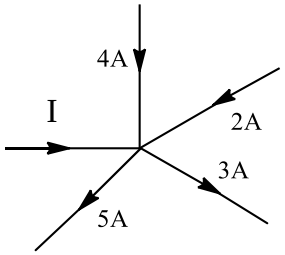
8. Resistance as shown in figure is negative at;



(1) A (2) B

(3) C (4) None of these

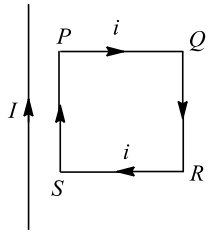
9. In the given current distribution, what is the value of I?



(1) 3A (2) 8A

(3) 2A (4) 5A

10. A square loop carrying a current i 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 I is established in wire as shown in figure, the loop will:



(1) Rotate about an axis parallel to the wire
(2) Move away from the wire to towards right
(3) Move towards the wire
(4) Remain stationary

11. A straight conductor carries a current of $5A$. An electron travelling with a speed of $5 \times 10^6 ms^{-1}$ parallel to the wire at a distance of 0.1m from the conductor, experiences a force of;

(1) 8×10^{-20} N (2) 3.2×10^{-19} N
(3) 8×10^{-18} N (4) 1.6×10^{-19} N

12. Two ions having masses in the ratio 1 : 1 and charges 1 : 2 are projected into uniform magnetic field perpendicular to the field with speeds in the ratio 2 : 3. The ratio of the radius of circular paths along which the two particles move is;

(1) 4 : 3 (2) 2 : 3
(3) 3 : 1 (4) 1 : 4

13. For a paramagnetic material, the dependence of the magnetic susceptibility χ on the absolute temperature is given as;

(1) $\chi \propto T$ (2) $\chi \propto 1/T^2$
(3) $\chi \propto 1/T$ (4) Independent

14. The relative magnetic permeability of ferromagnetic materials is in the order of;

(1) 10 (2) 100
(3) 1000 (4) 10000

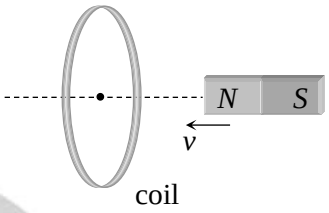
15. An electron moving around the nucleus with an angular momentum l has a magnetic moment;

(1) $\frac{e}{m}l$ (2) $\frac{e}{2m}l$
(3) $\frac{2e}{m}l$ (4) $\frac{e}{2\pi m}l$

16. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 >> R_2$, the mutual inductance M between them will be directly proportional to;

(1) R_1/R_2 (2) R_2/R_1
(3) R_1^2/R_2 (4) R_2^2/R_1

17. In the following figure, the magnet is moved towards the coil with a speed v and induced emf e. If magnet and coil recede away from one another each moving with speed v, the induced emf in the coil will be:



(1) e (2) $2e$
(3) $e/2$ (4) $4e$

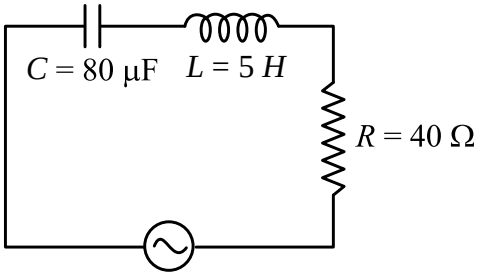
18. If a change in current of $0.01A$ in one coil produces a change in magnetic flux of 1.2×10^{-2} Wb in the other coil, then the mutual inductance of the two coils in henry is;

(1) 0 (2) 0.5
(3) 1.2 (4) 3

19. The initial phase angle for $i = 10 \sin\omega t + 8 \cos \omega t$ is;

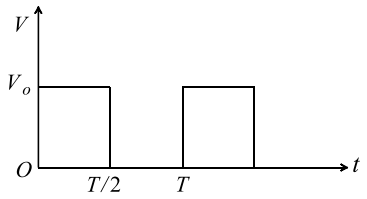
(1) $\tan^{-1}\left(\frac{4}{5}\right)$ (2) $\tan^{-1}\left(\frac{5}{4}\right)$
(3) $\sin^{-1}\left(\frac{4}{5}\right)$ (4) 90°

20. From figure shown below a series $L - C - R$ circuit connected to a variable frequency 200 V source. $C = 80$ μF and $R = 40$ Ω. Then the source frequency which drive the circuit at resonance is;



(1) 25 Hz (2) $\frac{25}{\pi}$ Hz
(3) 50 Hz (4) $\frac{50}{\pi}$ Hz

21. The *r.m.s* value of potential difference *V* shown in the figure is;



(1) $\frac{V_0}{2}$ (2) $\frac{V_0}{\sqrt{3}}$

(3) V_0 (4) $\frac{V_0}{\sqrt{2}}$

22. If ε_0 and μ_0 represent the permittivity and permeability of vacuum and ε and μ represent the permittivity and permeability of medium, then refractive index of the medium is given by;

(1) $\sqrt{\frac{\mu_0\varepsilon_0}{\mu\varepsilon}}$ (2) $\sqrt{\frac{\mu\varepsilon}{\mu_0\varepsilon_0}}$

(3) $\sqrt{\frac{\mu}{\mu_0\varepsilon_0}}$ (4) $\sqrt{\frac{\mu_0\varepsilon_0}{\mu}}$

23. A point source of electromagnetic radiation has an average power output of 800 W. The maximum value of electric filed at a distance 4.0 m from the source is;

(1) 64.7 Vm^{-1} (2) 57.8 Vm^{-1}

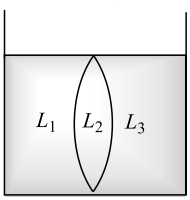
(3) 56.72 Vm^{-1} (4) 54.77 Vm^{-1}

24. A plane Electromagnetic Wave travels in free space along x-axis. At a particular point in space, the electric field along y-axis is 9.3 Vm^{-1}. The magnetic induction is;

(1) 3.1×10^{-8}T (2) 3×10^{-5} T

(3) 3×10^{-6} T (4) 9.3×10^{-6} T

25. As shown in figure, the liquids, L_1, L_2 and L_3 have refractive indices 1.55, 1.50 and 1.20 respectively. Therefore, the arrangement corresponds to;



(1) Biconvex lens

(2) Biconcave lens

(3) Concave-convex lens

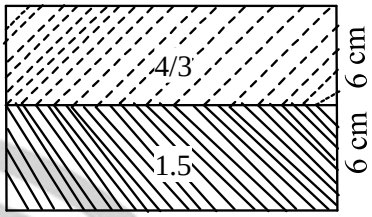
(4) Convex-concave lens

26. Under minimum deviation condition in a prism, if a ray is incident at an angle 30°, the angle between the emergent ray and the second refracting surface of the prism is

(1) 0° (2) 30°

(3) 45° (4) 60°

27. Two immiscible liquids of refractive indices 1.5 and $\frac{4}{3}$ are filled in glass jar each of length 6 cm. A light of source *S* is at the bottom of the jar, the apparent depth of light source will be:



(1) 12.5 cm (2) 17 cm

(3) 12 cm (4) 8.5 cm

28. When one of the slits of Young's experiment is covered with a transparent sheet of thickness 4.8 mm, the central fringe shifts to a position originally occupied by the 30^{th} bright fringe. What should be the thickness of the sheet if the central fringe has to shift to the position occupied by 20^{th} bright fringe?

(1) 3.8 mm (2) 1.6 mm

(3) 7.6 mm (4) 3.2 mm

29. Two identical light waves, propagating in the same direction, have a phase difference δ. After they superpose, the intensity of the resulting wave will be proportional to;

(1) $\cos\delta$ (2) $\cos\left(\frac{\delta}{2}\right)$

(3) $\cos^2\left(\frac{\delta}{2}\right)$ (4) $\cos^2\delta$

30. A single slit of width d is illuminated by violet light of wavelength 400 nm and the width of the diffraction pattern is measured as *y*. When half of the slit width is covered and illuminated by yellow light of wavelength 600 nm, the width of the diffraction pattern is;

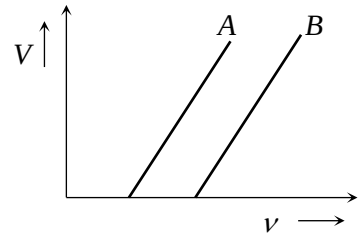
(1) The pattern vanishes and the width is zero

(2) $\frac{y}{3}$

(3) $3y$

(4) None of the above

31. The stopping potential as a function of the frequency of the incident radiation is plotted for two different photoelectric surfaces *A* and *B*. The graphs show that work function of *A* is;



(1) Greater than that of *B*
(2) Smaller than that of *B*
(3) Equal to that of *B*
(4) No inference can be drawn about their work functions from the given graphs

32. A proton and an α-particle are accelerated through same potential difference. The ratio of their de-Broglie wavelengths λ_p/λ_α will be:

(1) $\frac{1}{\sqrt{8}}$ (2) $\sqrt{8}$
(3) 2 (4) 1

33. For photoelectric emission, tungsten requires light of 2300 Å. If light of 1800 Å wavelength is incident then emission;
(1) Takes place
(2) Doesn't take place
(3) May or may not take place
(4) Depends on frequency

34. The energy of an electron in an excited hydrogen atom is –3.4eV. Its angular momentum is;
(1) 3.72×10^{-34} Js
(2) 2.11×10^{-34} Js
(3) 1.57×10^{-34} Js
(4) 1.11×10^{-34} Js

35. If the electron in hydrogen atom jumps from the third to second orbit, the wavelength of the emitted radiation in terms of Rydberg constant *R* is given by;

(1) $\lambda = \frac{36}{5R}$ (2.) $\lambda = \frac{5R}{36}$
(3) $\lambda = \frac{5}{R}$ (4) $\lambda = \frac{R}{6}$

SECTION-B

36. In Bohr's model of hydrogen atom, which of the following pairs of quantities are quantized?
(1) Energy and linear momentum
(2) Linear and angular momentum
(3) Energy and angular momentum
(4) None of the above

37. A radioactive element X disintegrates successfully

$$X \xrightarrow{\beta^-} X_1 \xrightarrow{\alpha} X_2 \xrightarrow{\beta^-} X_3 \xrightarrow{\alpha} X_4$$

If atomic number and atomic mass number of *X* are respectively, 72 and 180, then what are the corresponding values for X_4?
(1) 69, 172 (2) 69, 176
(3) 71, 176 (4) 70, 172

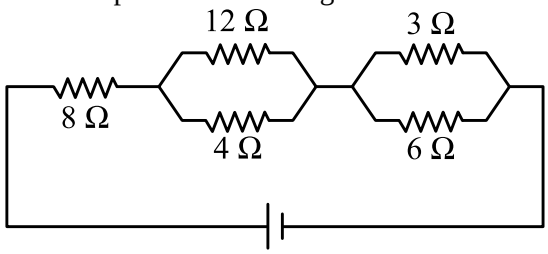
38. **Assertion (A):** If the distance between parallel plates of a capacitor is halved and dielectric constant is made three times, then the capacitance becomes 6 times.
Reason (R): Capacity of the capacitor depends upon the nature of the material between the plates.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

39. Match **List-I** with **List-II** to find out the **correct** option.

	List-I		**List-II**
A	Electric charge	I	$[M^{-1}L^{-3}T^4A^2]$
B	Electric field strength	II	$[MLT^{-3}A^{-1}]$
C	Absolute permittivity	II	$[M^0L^1T^1A^1]$
D	Electric dipole	IV	None

(1) A → IV, B → II, C → I, D → III
(2) A → IV, B → II, C → III, D → I
(3) A → II, B → I, C → IV, D → III
(4) A → II, B → II, C → I, D → IV

40. In the circuit diagram shown in figure, potential difference across 3 Ω resistance is 20 V. Then, match the following two columns and choose the **correct** option from codes given below.



	List-I	List-II	
A	Potential difference across 6 Ω resistance	I	30 V
B	Potential difference across 4 Ω resistance	II	40 V
C	Potential difference across 12 Ω resistance	III	20 V
D	Potential difference across 8 Ω resistance	IV	80 V

(1) A → I, B → III, C → IV, D → I
(2) A → I, B → III, C → III, D → IV
(3) A → III, B → I, C → I, D → IV
(4) A → III, B → II, C → IV, D → I

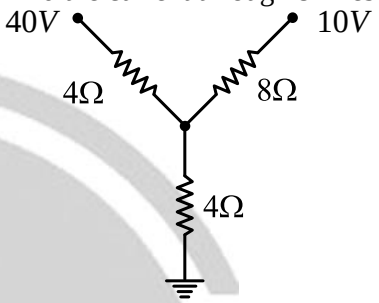
41. **Statement-I:** In an unbiased *p-n* junction, holes diffuse from the *p*-region to *n*-region.
Statement-II: Hole concentration in *p*-region is more as compared to *n*-region.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

42. **Assertion (A):** Angular momentum of single electron in any orbit of hydrogen type atoms is independent of the atomic number of the element.
Reason (R): In ground state, angular momentum is minimum.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

43. **Statement I:** Incoming light reflected by earth is partially polarised.
Statement II: Atmospheric particle also can polarises the light.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

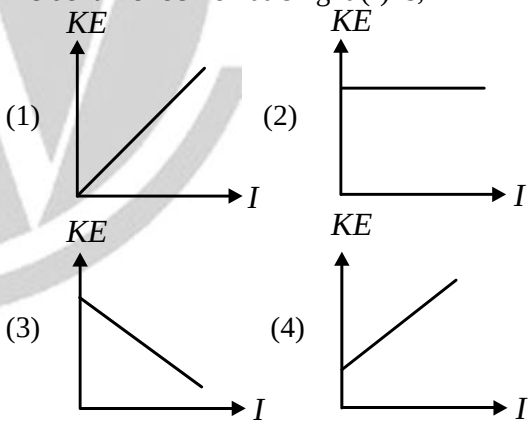
44. **Statement I:** In an *AC*, only capacitor circuit has instantaneous power equals to zero at any instant of time.
Statement II: Phase difference between current function and voltage function is 90°.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

45. Find the current through 8Ω resistor;

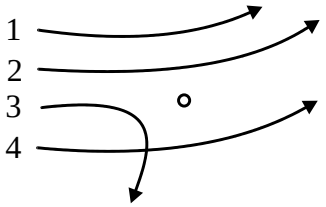


(1) 0.5A (2) 1 A
(3) 3 A (4) 4.5 A

46. The correct graph between maximum kinetic energy (*KE*) of photoelectron and intensity of incident monochromatic light (*I*) is;

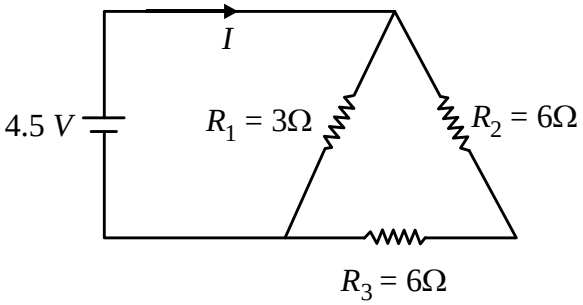


47. The diagram shows the path of four α-particles of the same energy being scattered by the nucleus of an atom simultaneously. Which of these is/are not physically possible?



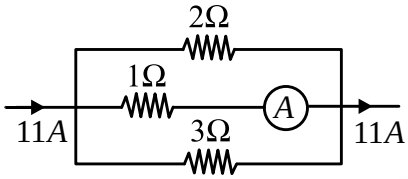
(1) 3 and 4 (2) 2 and 3
(3) 1 and 4 (4) 4 only

48. The current (I) in the given circuit is;



(1) 1.6 A (2) 2 A
(3) 0.32 A (4) 3.2 A

49. The ammeter reading in the circuit below is;



(1) 2 A (2) 3 A
(3) 6 A (4) 5 A

50. Two coherent sources with intensities I_1 and I_2 interfere to form a fringe pattern on screen. The value of $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ is;

(1) $\frac{I_1+I_2}{\sqrt{I_1I_2}}$

(2) $\frac{\sqrt{I_1I_2}}{I_1+I_2}$

(3) $\frac{I_1+I_2}{2\sqrt{I_1I_2}}$

(4) $\frac{2\sqrt{I_1I_2}}{I_1+I_2}$