JUPITER ACADEMY

NEET UG PHY - SAMPLE PAPER - 12 - 01
NEET-UG - PHYSICS

Time Allowed : 60 mins **Maximum Marks :** 200

Section A

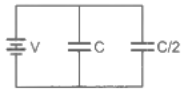
1) An electron moves through a small distance in a uniform electric field. The magnitude of electric field is 2×10^4 NC^{-1}. Now, if the direction of field is reversed keeping the magnitude same and a proton moves through the same distance, then which of the following options is correct? **[4]**

a) The time of travel will be more in the case of the proton.
b) The time of travel will be independent of charge.
c) The time of travel will be more in case of electron.
d) The time of travel will be the same in both cases.

2) Two positive ions, each carrying a charge q, are separated by a distance d. If F is the force of repulsion between the ions, the number of electrons missing from each ion will be: (e being the charge on an electron) **[4]**

a) $\sqrt{\frac{4\pi\varepsilon_0 Fe^2}{d^2}}$
b) $\frac{4\pi\varepsilon_0 Fd^2}{e^2}$
c) $\sqrt{\frac{4\pi\varepsilon_0 Fd^2}{e^2}}$
d) $\frac{4\pi\varepsilon_0 Fd^2}{q^2}$

3) Two condensers, one of capacity C and other of capacity $\frac{C}{2}$ are connected to a V volt battery, as shown in the figure. The work done in charging fully both the condensers is:



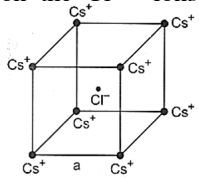
[4]

a) $\frac{1}{2}CV^2$ b) $2\ CV^2$
c) $\frac{3}{4}CV^2$ d) $\frac{1}{4}CV^2$

4) What is not true for equipotential surface for uniform electric field? **[4]**

a) Work done is zero
b) Electric lines are perpendicular to equipotential surface
c) Equipotential surface is spherical
d) Equipotential surface is flat

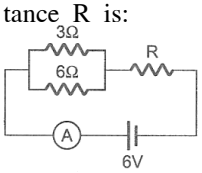
5) In the basic CsCl crystal structure, Cs^+ and Cl^- ions are arranged in a bcc configuration as shown in the figure. The net electrostatic force exerted by the eight Cs^+ ions on the Cl^- ions is:



[4]

a) $\frac{1}{4\pi\varepsilon_0}\frac{16e^2}{3a^2}$
b) $\frac{1}{4\pi\varepsilon_0}\frac{4e^2}{3a^2}$
c) Zero
d) $\frac{1}{4\pi\varepsilon_0}-\frac{32e^2}{3a^2}$

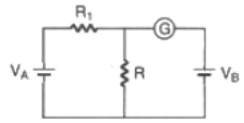
6) If the ammeter in the given circuit reads 2 A, the resistance R is:



[4]

a) 3 ohm b) 4 ohm
c) 2 ohm d) 1 ohm

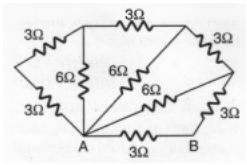
7) In the circuit shown the cells A and B have negligible resistances. For V_A - 12 volt, Rx = 500Ω , R = 100Ω , the galvanometer (G) shows no deflection. The value of V_B is:



[4]

a) 12V b) 6V
c) 2V d) 4V

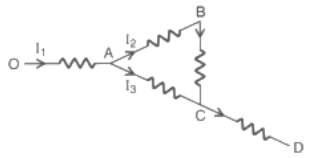
8) The resistances in the following figure are in ohm. Then, the effective resistance between points A and B is:



[4]

a) 3Ω b) 6Ω
c) 2Ω d) 36Ω

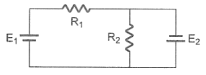
9) The current in the branch CD in the circuit shown below will be:



[4]

a) $L_1 + l_3$ b) $L_1 - l_3$
c) $L_2 + l_3$ d) $L_1 + l_2$

10) Two resistances R_1 and R_2 are joined, as shown in the following figure, to two batteries of emfs E_1 and E_2. If E_2 is short - circuited, the current through R_1 is:



[4]

a) $\frac{E_2}{R_1}$
b) $\frac{E_1}{R_1}$
c) $\frac{E_1}{(R_1 + R_2)}$
d) $\frac{E_2}{R_2}$

11) An electron is shot in steady electric and magnetic fields

such that its velocity v, electric field E and magnetic field B are mutually perpendicular. The magnitude of E is 1 volt/cm and that of B is 2T. Now, it happens that the Lorentz force cancels with the electrostatic force on the electron; then the velocity of the electron is: **[4]**

a) 0.5 cm/s b) 2 cm/s
c) 50 m/s d) 200 m/s

12) An electron having mass (9.1×10^{-31} kg) and charge (1.6×10^{-19} C) moves in a circular path of radius 0.5 m with a velocity 10^6 m/s in a magnetic field. Strength of the magnetic field is: **[4]**

a) 5.6×10^{-6} T b) 3.6×10^{-6} T
c) 2.8×10^{-6} T d) 1.13×10^{-5} T

13) The magnetic material which moves from stronger to weaker parts of a magnetic field is known as: **[4]**

a) Paramagnetic b) Anti - ferromagnetic
c) Ferromagnetic d) Diamagnetic

14) A magnet of length 0.1 m and pole strength 10^{-4} A - m is kept in a magnetic field of 30 Wb/m^2 at an angle 30^o. The couple acting on it is _____ $\times 10^{-4}$ Nm: **[4]**

a) 4.5 b) 7.5
c) 1.5 d) 3.0

15) Two conducting coils are placed coaxially. A cell is placed in one coil, then they will:

i. Attract each other
ii. Repel each other
iii. Both of attracting each other and repel each other
iv. They will not experience any force

[4]

a) I and ii b) Iv and i
c) Iii and iv d) Only ii

16) A coil of area 0.1 m^2 has 500 turns. After placing the coil in a magnetic field of strength 4×10^{-4} wb/m^2, it is rotated through 90° in 0.1 sec. The average emf induced in the coil is: **[4]**

a) 0.2 volt b) 0.1 volt
c) 0.012 volt d) 0.05 volt

17) The potential difference V across and the current I flowing through an instrument in an AC circuit are given by: $V = 5\cos\omega t$ volt and $I = 2\sin\omega t$ amp
The power dissipated in the instrument is: **[4]**

a) 10 watt b) 2.5 watt
c) 5 watt d) Zero watt

18) The power dissipated in an AC circuit is zero if the circuit is: **[4]**

a) Either purely inductive or purely capacitive
b) Purely capacitive only
c) Purely inductive only
d) Purely resistive

19) In an AC circuit, the e.m.f. and the current at any instant are respectively given by
$E = E_0 \sin\omega t$ and $I = I_0 \sin(\omega t - \phi)$
The average power in the circuit over one cycle of AC is **[4]**

a) $\frac{E_0 I_0}{2}\sin\phi$
b) $E_0 I_0/2$
c) $\frac{E_0 I_0}{2}\cos\phi$
d) $E_0 I_0$

20) The force exerted by the sunlight of intensity 1350 Wm^{-2}reflected from a reflecting surface of an aluminum sheet of area 10^4 m^2 is: **[4]**

a) 45 N b) 0.18 N
c) 0.72 N d) 0.09 N

21) The correct sequence of the increasing wavelength of the given radiation sources is:

i. Radioactive sources, X - ray tube, sodium vapour lamp
ii. Radioactive sources, X - ray tube, sodium vapour lamp, crystal oscillator
iii. X - ray tube, radioactive sources, sodium vapour lamp, crystal oscillator
iv. X - ray tube, crystal oscillator, radioactive sources, sodium vapour lamp

[4]

a) Only ii b) Iii and iv
c) Iv and i d) I and ii

22) In an electromagnetic wave in free space the root means the square value of the electric field is E_{rms} = 6V/m. The peak value of the magnetic field is: **[4]**

a) 2.83×10^{-8} T b) 0.70×10^{-8} T
c) 44.23×10^{-8} T d) 1.41×10^{-8} T

23) Which of the following is incorrect statement? **[4]**

a) The magnification produced by a convex mirror is always less than one
b) A virtual, erect, same - sized image can be obtained using a plane mirror
c) A real, inverted, same - sized image can be formed using a convex mirror
d) A virtual, erect, magnified image can be formed using a concave mirror

24) A point object is placed at a distance of 10 cm and its real image is formed at a distance of 20 cm from a concave mirror. If the object is moved by 0.1 cm towards the mirror, the image will shift by about: **[4]**

a) 0.8 cm away from the mirror
b) 0.4 cm away from the mirror
c) 0.4 cm towards the mirror
d) 0.8 cm towards the mirror

25) In Young's double - slit experiment, the wavelength of light $X = 4\times 10^{-7}$ m and separation between the slit is d = 0.1 mm. If the fringe width is 4 mm, then the separation between the slits and screen will be: **[4]**

a) $10\overset{o}{A}$
b) 1 m
c) 10^6 m
d) 100 mm

26) The distinguishable characteristic of a monochromatic light wave irrespective of medium is: **[4]**

a) Wavelength b) Velocity
c) Frequency d) Intensity

27) When light of wavelength 300 nm falls on a photoelectric emitter, photoelectrons are liberated. For another emitter, light of wavelength 600 nm is sufficient for liberating photoelectrons. The ratio of the work function of the two emitters is: **[4]**

a) 2 : 1 b) 4 : 1
c) 1 : 4 d) 1 : 2

28) Consider the following statements:

i. The energy E of a photon of frequency v is E = hv, where h is Planck's constant.
ii. The momentum p of a photon is $p = \frac{h}{\lambda}$, where λ is the wavelength of the photon.

From the above statements, one may conclude that the wave velocity of light is equal to: **[4]**

a) $(\frac{E}{p})^2$ b) 3×10^8 m/sec
c) Ep d) $\frac{E}{p}$

29) Given that a photon of light of wavelength 10,000 angstrom has an energy equal to 1.23 eV. When light of wavelength 5000 angstrom and intensity I_0 falls on a photoelectric cell, the saturation current is 0.40×10^{-6} ampere and the stopping potential is 1.36 volt; if the intensity of light is made $4I_0$, if the cathode and the anode are kept at the same potential, the emitted electrons: **[4]**

a) All have the minimum KE equal to 1.36 eV
b) All have the same KE equal to 1.36 eV
c) All have the average KE equal to $(\frac{1.36}{2})$ eV
d) All have the maximum KE equal to 1.36 eV

30) A continuous band of radiation having all wavelengths from about 1000 $\overset{o}{A}$ to 10,000 $\overset{o}{A}$ is passed through a gas of monoatomic hydrogen. In the emission spectrum, one can observe the entire: **[4]**

a) Lyman series b) Balmer series
c) Pfund series d) Paschen series

31) The ratio (in SI units) of magnetic dipole moment to that of the angular momentum of electron of mass m kg and charge e coulomb in Bohr's orbit of a hydrogen atom is: **[4]**

a) $\frac{e}{m}$ b) $\frac{2e}{m}$
c) $\frac{e}{2m}$ d) $\frac{4e}{m}$

32) $_{92}U^{238}$ on absorbing a neutron goes over to $_{92}U^{239}$. This nucleus emits an electron to go over to neptunium which on further emitting an electron goes over to plutonium. The plutonium nucleus can be expressed as: **[4]**

a) $_{92}Pu^{240}$ b) $_{94}Pu^{239}$
c) $_{92}Pu^{239}$ d) $_{93}Pu^{240}$

33) 10^{-3} kg of a radioactive isotope of atomic mass 226 emits 3.72×10^{10} α - particles in a second. If 4.2×10^{-2} J of energy is released in 1 hour in this process, the average energy of the α - particle is: **[4]**

a) 1.42 MeV b) 19.6 MeV
c) 9.2 MeV d) 1.96 MeV

34) In CE mode, the input characteristics of a transistor is the variation of: **[4]**

a) I_E against V_c
b) I_C against V_{CE} at constant V_{BE}
c) I_B against I_C
d) I_B against V_{be} at constant V_{CE}

35) For the determination of the co - efficient of viscosity of a given liquid, a graph between square of the radius of the spherical steel balls and their terminal velocity is plotted. The slope of the graph is given by **[4]**

a) $\frac{V^2}{r}$
b) $\frac{V}{r}$
c) $\frac{V}{r^2}$
d) $\frac{r^2}{V}$

Section B

36) **Assertion (A):** Surface charge density of an irregularly shaped conductor in non - uniform.
Reason (R): Surface density is defined as charge per unit area. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

37) **Assertion:** A parallel plate capacitor is connected across battery through a key. A dielectric slab of dielectric constant K is introduced between the plates. The energy which is stored becomes K times.
Reason: The surface density of charge on the plate remains constant or unchanged. **[4]**

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c) Assertion is correct statement but reason is wrong statement.
d) Assertion is wrong statement but reason is correct statement.

38) **Assertion (A):** Bending a wire does not affect electrical resistance.
Reason (R): Resistance of wire is proportional to the resistivity of the material. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

39) **Assertion (A):**Ohm's law is applicable for all conducting elements.
Reason (R): Ohm's law is a fundamental law. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

40) **Assertion:** The resultant magnetic field of circular loop is due to x - component.
Reason: In circular loop of wire, perpendicular components of magnetic field at some distance from centre of loop turned over the whole loop, the result is zero. **[4]**

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c) Assertion is correct statement but reason is wrong statement.
d) Assertion is wrong statement but reason is correct statement.

41) **Assertion:** Paramagnetism is explained by Domain theory.
Reason: Susceptibility of a diamagnetic substance is independent of temperature. **[4]**

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

42) **Assertion (A):** If current changes through a circuit, eddy currents are induced in the nearby iron plates.
Reason (R): Due to a change of current, the magnetic flux through iron plate changes. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

43) **Assertion (A):**It is advantageous to transmit electric power at high voltage.
Reason (R): High voltage implies high current. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

44) **Assertion (A):** Velocity of light is constant in all media.
Reason (R): Light is electromagnetic wave which have constant velocity in all media. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) Both A and R are false.

45) **Assertion (A):** Convergent lens property of converging remain same in all mediums.
Reason (R): Property of lens whether the ray is diverging or converging is independent of the surrounding medium. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

46) **Assertion (A):** If the whole apparatus of Young's experiment is immersed in liquid, the fringe width will decrease.
Reason (R): The wavelength of light in water is more than that of air. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

47) **Assertion (A):** In Young's double - slit experiment if wavelength of incident monochromatic light is just doubled, number of bright fringe on the screen will increase.
Reason (R): Maximum number of bright fringe on the screen is inversely proportional to the wavelength of light used. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

48) **Assertion (A):**In process of photoelectric emission, all emitted electrons do not have same kinetic energy.
Reason (R): If radiation falling on the photosensitive surface of metal consists of different wavelengths then energy acquired by electrons absorbing photons of different wavelengths shall be different. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

49) **Assertion (A):**The electron in the hydrogen atom passes from energy level n = 4 to the n = 1 level. The maximum and a minimum number of photons that can be emitted is six and one respectively.
Reason (R): The photons are emitted when an electron makes a transition from the higher energy state to the lower energy state. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

50) **Assertion (A):**The heavier nuclei tend to have larger N/Z ratio because neutron does not exert electric force.
Reason (R): Coulomb forces have longer range compared to the nuclear force. **[4]**

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.