

## JUPITER ACADEMY

NEET PHYSICS SAMPLE PAPER - 12 - 02  
NEET-UG - PHYSICS

Time Allowed : 60 mins

Maximum Marks : 200

## Section A

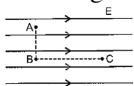
1) Midway between two equal and similar charges, a third similar charge is placed. Which of the following statements is correct? [4]

- The third charge is in unstable equilibrium.
- The third charge experiences a net force inclined to the line joining the charges.
- The third charge is in a stable equilibrium.
- The third charge experiences a net force perpendicular to the line joining the charges.

2) The total electric flux emanating from a closed surface enclosing an  $\alpha$  - particle ( $e$  - electronic charge) is: [4]

- $e\epsilon_0$
- $\frac{\epsilon_0 e}{4}$
- $\frac{e}{\epsilon_0}$
- $\frac{2e}{\epsilon_0}$

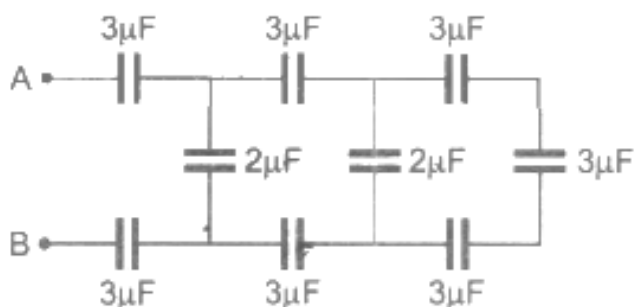
3) Figure shows three points A, B and C in a region of uniform electric field  $\vec{E}$ . The line AB is perpendicular and BC is parallel to the field lines. Then, which of the following holds good?



[4]

- $V_A > V_B = V_C$
- $V_A = V_B = V_C$
- $V_A = V_B < V_C$
- $V_A = V_B > V_C$

4) The equivalent capacitance between A and B is (in  $\mu$ F)



[4]

- 25
- $\frac{84}{25}$
- 9
- 1

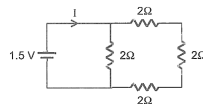
5) A  $10\mu$ F capacitor is charged to a potential difference of 1000 V. The terminals of the charged capacitor are disconnected from the power supply and connected to the terminals of an uncharged  $6\mu$ F capacitor. What is the final potential difference across each capacitor? [4]

- 100 V
- 167 V
- 250 V
- 625 V

6) An electric bulb marked 40 W and 200 V, is used in a circuit of supply voltage 100 V. Now its power is [4]

- 10 W
- 40 W
- 100 W
- 20 W

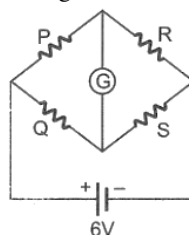
7) The value of I in the following diagram will be:



[4]

- 2 amp
- 3 amp
- 4 amp
- 1 amp

8) In the Wheatstone's network given,  $P = 10\Omega$ ;  $Q = 20\Omega$ ;  $R = 15\Omega$  and  $S = 30\Omega$ . The current passing through the battery (of negligible internal resistance) is:



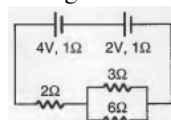
[4]

- 0 A
- 0.36 A
- 0.72 A
- 0.18 A

9) A battery of emf 10 V and internal resistance  $3\Omega$  is connected to a resistor. If the current in the circuit is 0.5 A, what is the resistance of the resistor? [4]

- $19\Omega$
- $17\Omega$
- $15\Omega$
- $13\Omega$

10) Two cells having emf 4V and 2V and internal resistance  $1\Omega$  and  $1\Omega$  are connected as shown in the figure. Current through  $6\Omega$  resistance is:



[4]

- $(\frac{1}{3})$  A
- $(\frac{2}{5})$  A
- $(\frac{2}{3})$  A
- $(\frac{2}{9})$  A

11) The magnetic field due to a current - carrying circular loop of radius 3 cm at a point on the axis at a distance of 4 cm from the centre is  $54\mu$  T. What will be its value at the centre of the loop? [4]

- $125\mu$  T
- $250\mu$  T
- $150\mu$  T
- $75\mu$  T

12) A solenoid of 0.4 m length with 500 turns carries a current of 3 A. A coil of 10 turns and of radius 0.01 m carries a current of 0.4 A. The torque required to hold the coil with its axis at right angles to that of solenoid in the middle part of it, is: [4]

- $12\pi^2 \times 10^{-7}$  N - m
- $3\pi^2 \times 10^{-7}$  N - m
- $6\pi^2 \times 10^{-7}$  N - m
- $9\pi^2 \times 10^{-7}$  N - m

13) Which of the following is true?

- Diamagnetism is temperature - dependent
- Paramagnetism is temperature - dependent

- iii. Paramagnetism is temperature independent  
iv. None of these

[4]

- a) Only (C)                      b) Only (D)  
c) Only (B)                      d) Only (A)

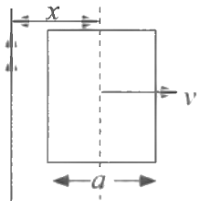
- 14) The coil of a sensitive moving coil galvanometer swings too far on both sides. This movement can be quickly stopped by: [4]

- a) Connecting a large resistance across the ends of the coil  
b) Holding a magnet near the coil  
c) Connecting a short length of copper wire across the ends of the coil  
d) Earthing the case of the galvanometer

- 15) When a small piece of wire passes between the magnetic poles of a horseshoe magnet in 0.1 s, emf of  $4 \times 10^{-3}$  V is induced in it. The magnetic flux between the poles is: [4]

- a)  $4 \times 10^{-3}$  Wb                      b)  $4 \times 10^{-2}$  Wb  
c)  $4 \times 10^{-4}$  Wb                      d)  $4 \times 10^{-6}$  Wb

- 16) A conducting square frame of side  $a$  and a long straight wire carrying current  $I$  are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity  $v$ . The emf induced in the frame will be proportional to:



[4]

- a)  $\frac{1}{(2x-a)^2}$   
b)  $\frac{1}{(2x-a)(2x+a)}$   
c)  $\frac{1}{x^2}$   
d)  $\frac{1}{(2x+a)^2}$

- 17) A series LCR circuit has  $R = 5 \Omega$ ,  $L = 40$  mH and  $C = 1 \mu$  F, the bandwidth of the circuit is: [4]

- a) 10 Hz                              b) 20 Hz  
c) 40 Hz                              d) 30 Hz

- 18) In an L - C - R series AC circuit, if  $\omega_0$  is the resonant angular frequency, then the quality factor (Q - factor) is given by: [4]

- a)  $\omega_0 L/C$   
b)  $\frac{L}{\omega_0 R}$   
c)  $(\frac{1}{R}) \sqrt{\frac{L}{C}}$   
d)  $\frac{\omega_0 C}{R}$

- 19) A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 amp, the efficiency of the transformer is approximate: [4]

- a) 90%                              b) 30%  
c) 10%                              d) 50%

- 20) A point source of electromagnetic radiation has an average power output of 1500 W. The maximum value of the electric field at a distance of 3 m from this source (in  $\text{Vm}^{-1}$ ) is: [4]

- a)  $\frac{250}{3}$                               b) 100  
c)  $\frac{500}{3}$                               d) 500

- 21) When a beam of accelerated electrons hits a target, a continuous X - ray spectrum is emitted from the target. Which one of the following wavelengths is absent in the X - ray spectrum if the X - ray tube is operating at 40,000 volt? [4]

- a)  $1.5 \text{ \AA}$   
b)  $1.0 \text{ \AA}$   
c)  $0.25 \text{ \AA}$   
d)  $0.5 \text{ \AA}$

- 22) For continuous X - ray, the produced wavelength is: [4]

- a) Inversely proportional to the energy of the electrons hitting the target  
b) Inversely proportional to the intensity of the electron beam  
c) Proportional to the intensity of the electron beam  
d) Proportional to target temperature

- 23) A ray of light incident at an angle  $i$  is refracted at angle  $r$  into a glass slab of thickness  $t$ . Then the lateral displacement of the emergent ray is: [4]

- a)  $T \sin(i - r) \cos r$                       b)  $T \sin(i - r)/\cos r$   
c)  $T \sin i/\cos r$                               d)  $T \sin(i + r)/\cos r$

- 24) For obtaining a magnified erect image of a distant object a convex lens and the following should be used: [4]

- a) A convex mirror                      b) A concave lens  
c) A convex lens                              d) A concave mirror

- 25) The fringe width of bands in Young's double - slit experiment can be increased by: [4]

- a) Decreasing the distance between the two sources  
b) Decreasing the wavelength of light used  
c) Dipping the apparatus into water  
d) Increasing the distance between the two sources

- 26) In interference pattern, the energy is: [4]

- a) All of these  
b) Destroyed at the minimum  
c) Created at the maximum  
d) Conserved but redistributed

- 27) If an electron and a proton have the same de Broglie wavelength then: [4]

- a) Both have equal momentum  
b) Both have zero momentum  
c) The proton has greater momentum  
d) The electron has greater momentum

- 28) The wavelength  $\lambda_e$  of an electron and  $\lambda_p$  of a photon of same energy  $E$  are related by: [4]

- a)  $\lambda_p \propto \lambda_e^2$   
b)  $\lambda_p \propto \lambda_e$   
c)  $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$   
d)  $\lambda_p \propto \sqrt{\lambda_e}$

- 29) An electron is accelerated from rest through a potential difference of  $V$  volt. If the de Broglie wavelength of the electron is  $1.227 \times 10^{-2}$  nm, the potential difference is: [4]

- a)  $10^4$  V                              b) 10 V  
c)  $10^2$  V                              d)  $10^3$  V

- 30) The de Broglie wavelength of an electron in 2nd orbit of the hydrogen atom is: ( $a_0 = \text{Bohr's radius}$ ) [4]

- a)  $4\pi a_0$                               b)  $8\pi a_0$   
c)  $16\pi a_0$                               d)  $2\pi a_0$

- 31) The frequency of the first line of the Balmer series in a hydrogen atom is  $\nu_0$  Hz. The frequency  $\nu$  of the line emitted by a singly ionised He - atom is: [4]
- $4\nu_0$  Hz
  - $(\frac{\nu_0}{4})$  Hz
  - $(\frac{\nu_0}{2})$  Hz
  - $2\nu_0$  Hz
- 32) The radioactivity of a sample is  $A_1$  at time  $t_1$  and  $A_2$  at time  $t_2$ . If the mean life of the specimen is  $T$ , the number of atoms that have disintegrated in the time interval of  $(t_2 - t_1)$  is: [4]
- $\frac{(A_1 - A_2)}{T}$
  - $(A_1 - A_2)T$
  - $A_1 t_1 - A_2 t_2$
  - $(A_1 - A_2)$
- 33) Complete the following nuclear reaction:  
 ${}_{92}\text{U}^{238} \rightarrow \dots + {}_2\text{He}^4$  [4]
- ${}_{90}\text{Pu}^{234}$
  - ${}_{92}\text{Ra}^{234}$
  - ${}_{90}\text{Th}^{234}$
  - ${}_{90}\text{U}^{234}$
- 34) A p - n junction diode cannot be used for: [4]
- Rectification
  - Obtaining light radiation
  - Amplification
  - Detecting light intensity
- 35) For a common emitter amplifier, the current gain is 60. If  $I_E$  is 6.6 mA, then  $I_B$  is: [4]
- 0.20 mA
  - 0.15 mA
  - 0.11 mA
  - 0.06 mA

### Section B

- 36) **Assertion (A):** Ongoing away from a point charge or a small electric dipole, the electric field decreases at the same rate in both cases.  
**Reason (R):** Electric field is inversely proportional to the square of the distance from the charge. [4]
- Both A and R are true and R is the correct explanation of A
  - Both A and R are true but R is NOT the correct explanation of A
  - A is true but R is false
  - A is false and R is also false
- 37) **Assertion:** If the distance between parallel plates of a capacitor is halved and dielectric constant is three times, then the capacitor becomes 6 times.  
**Reason:** Capacity of a capacitor does not depend upon the nature of the material. [4]
- Assertion and reason both are correct statements and reason is correct explanation for assertion.
  - Assertion and reason both are correct statements but reason is not correct explanation for assertion.
  - Assertion is correct statement but reason is wrong statement.
  - Assertion is wrong statement but reason is correct statement.
- 38) **Assertion (A):** There is no current in the metals in the absence of an electric field.  
**Reason (R):** Motion of free electrons is random. [4]
- Both A and R are true and R is the correct explanation of A.
  - Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.
- Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.
- 39) **Assertion:** A current flows in a conductor only when there is an electric field within the conductor.  
**Reason:** The drift velocity of electrons in the presence of electric field decreases. [4]
- Assertion and reason both are correct statements and reason is correct explanation for assertion.
  - Assertion and reason both are correct statements but reason is not correct explanation for assertion.
  - Assertion is correct statement but reason is wrong statement.
  - Assertion is wrong statement but reason is correct statement.
- 40) **Assertion:** Magnetic Resonance Imaging (MRI) is a useful diagnostic tool for producing images of various parts of human body.  
**Reason:** Protons of various tissues of human body play a role in MRI. [4]
- Assertion and reason both are correct statements and reason is correct explanation for assertion.
  - Assertion and reason both are correct statements but reason is not correct explanation for assertion.
  - Assertion is correct statement but reason is wrong statement.
  - Assertion is wrong statement but reason is correct statement.
- 41) **Assertion:** Copper is a paramagnetic substance.  
**Reason:** Paramagnetic substance when placed in a magnetic field are feebly magnetised in a direction opposite to that of the magnetising field. [4]
- Assertion and reason both are correct statements and reason is correct explanation for assertion.
  - Assertion and reason both are correct statements but reason is not correct explanation for assertion.
  - Assertion is correct statement but reason is wrong statement.
  - If both assertion and reason are false.
- 42) **Assertion (A):** When number of turns in a coil is doubled, the coefficient of self - inductance of the coil becomes 4 times.  
**Reason (R):** This is because  $L \propto N^2$ . [4]
- Both A and R are true and R is the correct explanation of A.
  - Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.
- 43) **Assertion (A):** We use a thick wire in the secondary of a step - down transformer to reduce the production of heat.  
**Reason (R):** When the plane of the armature is parallel to the lines of force of the magnetic field, the magnitude of induced emf is maximum. [4]
- Both A and R are true and R is the correct explanation of A.
  - Both A and R are true but R is not the correct explanation of A.
  - A is true but R is false.
  - A is false but R is true.

- 44) **Assertion (A):** In an electromagnetic wave, electric field vector and magnetic field vector are mutually perpendicular.

**Reason (R):** Electromagnetic waves are transverse. [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.

- 45) **Assertion (A):** A ray incident along normal to the mirror retraces its path.

**Reason (R):** In reflection, angle of incidence is always equal to angle of reflection. [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):** The pattern and position of fringes always remain same even after the introduction of transparent medium in a path of one of the slit.

**Reason (R):** The central fringe is bright or dark is depend upon the initial phase difference between the two coherence sources. [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):** Universe is expanding.

**Reason (R):** There is red shift in the spectra of galaxies. [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):** If the frequency of an incident photon is twice the threshold frequency then two electrons are emitted.

**Reason (R):** According to Einstein's equation, Energy of of photon = Maximum kinetic energy of photo electron - work function. [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):** In H - atom, according to Bohr's theory electron revolves around the nucleus in orbits in which the angular momentum of the electron is an integral multiple of  $\frac{h}{2\pi}$ .

**Reason (R):** In H - atom, the mass of an electron is equal to the mass of a proton. [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):** Nuclear force is same between neutron - neutron, proton - proton and neutron proton.

**Reason (R):** Nuclear force is charge independent. [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.