Sample Question Paper - 1(TERM - I)

Class XII (Session - 2021-22)

Subject- Physics

Time Allowed: 90 minutes **Maximum Marks: 45**

General Instructions:

1. The Question Paper contains three sections.
2. Section A has 25 questions. Attempt any **20** questions.
3. Section B has 24 questions. Attempt any **20** questions.
4. Section C has 6 questions. Attempt any **5** questions.
5. All questions carry equal marks.
6. There is no negative marking.

Section – A

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

Q1. Which one of the following is not a property of field lines. **[1]**

(a) Field lines are continuous curves without any breaks.

(b) Two field lines cannot cross each other.

(c) Field lines start at positive charge and end at negative charge

(d) They form closed loop

Q 2. The positive terminal of 12 V battery is connected to the ground. Then the negative terminal will be at **[1]**

(a) -6 V (b) +12 V.

(c) zero (d) −12 V

Q 3. Two points P and Q are maintained at the potentials of 10 V and -4 V, respectively. The work done in moving 100 electrons from P to Q is: **[1]**

(a) 9.60×10^{-17} J

(b) -2.24×10^{-16} J

(c) 2.24×10^{-16} J

(d) -9.60×10^{-17} J

Q 4. If μ_0 is absolute permeability of vacuum and μ_r is relative magnetic permeability of another medium, then permeability μ of the medium is **[1]**

(a) $\mu_0\mu_r$

(b) μ_0/μ_r

(c) μ_r/μ_0

(d) $1/\mu_0\mu_r$

Q 5. A wire of radius r and another wire of radius 2r, both of same material and length are connected in series to each other. The combination is connected across a battery. The ratio of the heats produced in the two wires will be **[1]**

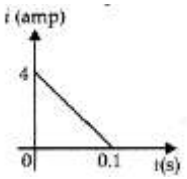
(a) 4.00

(b) 2.00

(c) 0.50

(d) 0.25

Q 6. In a coil of resistance 10Ω, the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in weber is **[1]**



(a) 8 (b) 2 (c) 6 (d) 4

Q7. A galvanometer of resistance 100Ω gives a full-scale deflection for a current of 10^{-5} A. To convert it into a ammeter capable of measuring upto 1 A, we should connect a resistance of **[1]**

(a) 1Ω in parallel

(b) $10^{-3}\Omega$ in parallel

(c) $10^{5}\Omega$ in series

(d) 100Ω in series

Q8. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true? **[1]**

(a) The electron will be accelerated along the axis

(b) The electron path will be circular about the axis

(c) The electron will experience a force at 45° to the axis and hence execute a helical path

(d) The electron will continue to move with uniform velocity along the axis of the solenoid

Q 9. If E_a be the electric field strength of a short dipole at a point on its axial line and E_e that on the equatorial line at the same distance, then **[1]**

(a) $E_e = 2E_a$

(b) $E_a = 2E_e$

(c) $E_a = E_e$

(d) None of these

Q10. Direction of force due to magnetic field on a moving charged particle is **[1]**

I. perpendicular to direction of velocity of charged particle.

II. perpendicular to direction of magnetic field.

III. parallel to direction of velocity of charged particle.

IV. parallel to the direction of magnetic field.

True/false statements are

(a) T, F, F, T (b) T, T, F, F

(c) T, F, T, F (d) F, F, T, T

Q11. Potentiometer measures potential more accurately because **[1]**

(a) it measures potential in open circuit

(b) it uses sensitive galvanometer for null deflection

(c) it uses high resistance potentiometer wire

(d) it measures potential in closed circuit

Q12. A and B are two points in an electric field. If the work done in carrying 4.0C of electrie charge from A to B is 16.0 J, the potential difference between A and B is **[1]**

(a) zero

(b) 2.0 V

(c) 4.0 V

(d) 16.0 V

Q13. A bar magnet is cut into two equal halves by a plane parallel to the magnetic axis. Which of the following physical quantities remains unchanged **[1]**

(a) pole strength

(b) magnetic moment

(c) intensity of magnetization

(d) None of these

Q14. The self inductance of a long solenoid can not be increased by **[1]**

(a) increasing its area of cross section

(b) increasing its length

(c) changing the medium with greater permeability

(d) increasing the current through it

Q15. A parallel plate condenser is immersed in an oil of dielectric constant 2 . The field between the plates is **[1]**

(a) increased, proportional to 2

(b) decreased, proportional to $\frac{1}{2}$

(c) increased, proportional to -2

(d) decreased, proportional to $-\frac{1}{2}$

Q16. Consider a neutral conducting sphere. A positive point charge is placed outside the sphere. The net charge on the sphere is then **[1]**

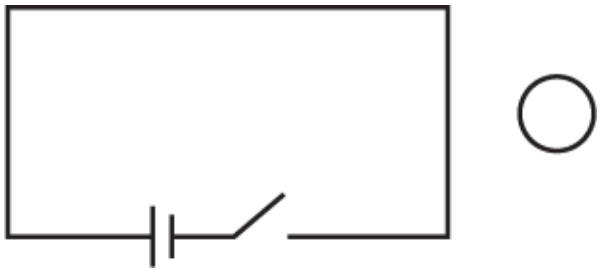
(a) negative and distributed uniformly over the surface of the sphere

(b) negative and appears only at the point on the sphere closest to the point charge

(c) negative and distributed non-uniformly over the entire surface of the sphere

(d) zero

Q17. Consider the situation shown in figure. If the switch is closed and after some time it is opened again, the closed loop will show **[1]**



(a) a clockwise current

(b) an anticlockwise current

(c) an anticlockwise current and then clockwise

(d) a clockwise current and then an anti clock wise current.

Q18. To draw a maximum current from a combination of cells, how should the cells be grouped? **[1]**

(a) Parallel

(b) Series

(c) Mixed grouping

(d) Depends upon the relative values of internal and external resistances.

Q19. A particle of mass m and charge q enters a magnetic field B perpendicularly with a velocity v. The radius of the circular path described by it will be **[1]**

(a) Bq/mv

(b) mq/Bv

(c) mB/qv

(d) mv/Bq

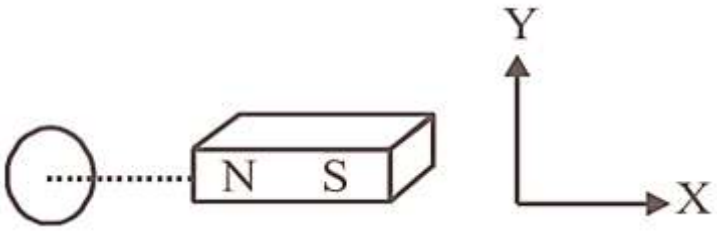
Q20. Consider coil and magnet **[1]**

Current is induced in coil when

I. coil and magnet both are at rest.

II. coil is at rest and magnet moves along x.

III. magnet is at rest and coil moves along x.



Then true/false statements are

(a) T, F, F

(b) T, T, F

(c) F, F, T

(d) F, T, T

Q21. A charged particle is free to move in an electric field. It will travel **[1]**

(a) always along a line of force

(b) along a line of force, if its initial velocity is zero

(c) along a line of force, if it has some initial velocity in the direction of an acute angle with the line of force

(d) none of the above

Q22. Two conducting spheres of radii R_1 and R_2 having charges Q_1 and Q_2 respectively are connected to each other. There is **[1]**

(a) no change in the energy of the system

(b) an increase in the energy of the system

(c) always a decrease in the energy of the system

(d) a decrease in the energy of the system unless $Q_1R_2 = Q_2R_1$

Q23. Alternating current cannot be measured by dc ammeter because

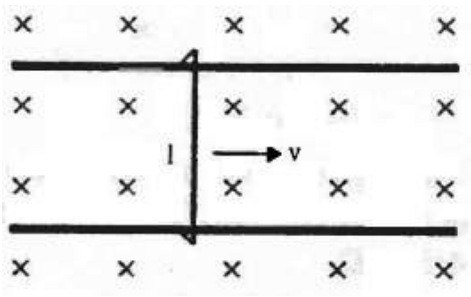
(a) average value of complete cycle is zero

(b) ac cannot pass through dc ammeter

(c) ac is virtual

(d) ac changes its direction

Q24. The figure shows a wire sliding on two parallel conducting rails placed at a separation I. A magnetic field B exists in a direction perpendicular to the plane of the rails. The force required to keep the wire moving at a constant velocity v will be [1]



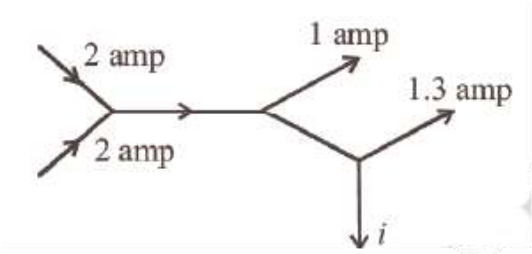
(a) evB

(b) $\frac{\mu_0 Bv}{4\pi I}$

(c) BIv

(d) zero

Q25. The figure below shows currents in a part of electric circuit. The current i is [1]



(a) 1.7amp (b) 3.7amp

(c) 1.3 amp (d) 1amp

Section – B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

Q26. A ball of mass 1 g carrying a charge 10^{-8}C moves from a point A at potential 600 V to a point B at zero potential. The change in its K.E. is [1]

(a) -6×10^{-6}erg

(b) -6×10^{-6} J

(c) 6×10^{-6} J

(d) 6×10^{-6}erg

Q27. In a region, the intensity of an electric field is given by $\vec{E} = 2\hat{i} + 3\hat{j} + \hat{k}$ in NC^{-1}. **[1]**

The electric flux through a surface $\vec{S} = 10\hat{i}m^2$ in the region is

(a) $5Nm^2C^{-1}$

(b) $10Nm^2C^{-1}$

(c) $15Nm^2C^{-1}$

(d) $20Nm^2C^{-1}$

Q28. If n cells each of emf ε and internal resistance r are connected in parallel, then the total emf and internal resistances will be **[1]**

(a) $\varepsilon, \frac{r}{n}$

(b) ε, nr

(c) $n\varepsilon, \frac{r}{n}$

(d) $n\varepsilon, nr$

Q29. The horizontal component of the earth's magnetic field is 3.6×10^{-5} tesla where the dip angle is 60°. The magnitude of the earth's magnetic field is **[1]**

(a) 2.8×10^{-4} tesla

(b) 7.2×10^{-5} tesla

(c) 2.1×10^{-4} tesla

(d) 3.6×10^{-5} tesla

Q30. If the resistance of a conductor is 5Ω at 50°C & 7Ω at 100°C, then mean temperature coefficient of resistance (of material) is **[1]**

(a) 0.013/ °C

(b) 0.004/ °C

(c) 0.006/ °C

(d) 0.008/ °C

Q31. A beam of electrons is moving with constant velocity in a region having simultaneous perpendicular electric and magnetic fields of strength $20Vm^{-1}$ and 0.5 T respectively at right angles to the direction of motion of the electrons. Then the velocity of electrons must be **[1]**

(a) 8 m/s

(b) 20 m/s

(c) 40 m/s

(d) $\frac{1}{40}$ m/s

Q32. Among two discs A and B, first have radius 10 cm and charge 10^{-6}μC and second have radius 30 cm and charge 10^{-5}C. When they are touched, charge on both q_A and q_B respectively will, be **[1]**

(a) $q_A = 2.75\mu C, q_B = 3.15\mu C$

(b) $q_A = 1.09\mu C, q_B = 1.53\mu C$

(c) $q_A = q_B = 5.5\mu C$

(d) None of these

Q33. A bar magnet of magnetic moment M and length L is cut into two equal parts each of length L/2. The magnetic moment of each part will be **[1]**

(a) M

(b) M/4

(c) $\sqrt{2}$M

(d) M/2

Q34. Three capacitors each of capacitance C and of breakdown voltage V are joined in series. The capacitance and breakdown voltage of the combination will be **[1]**

(a) 3C, $\frac{V}{3}$

(b) $\frac{C}{3}$, 3 V

(c) 3C, 3 V

(d) $\frac{C}{3}, \frac{V}{3}$

Q35. The surface density on the copper sphere is σ. The electric field strength on the surface of the sphere is **[1]**

(a) σ

(b) σ/2

(c) $\sigma/2\varepsilon_0$.

(d) σ/ε_0

Q36. A charged particle of mass m and charge q travels on a circular path of radius r that is perpendicular to a magnetic field B. The time taken by the particle to complete one revolution is **[1]**

(a) $\frac{2\pi q^2 B}{m}$

(b) $\frac{2\pi mq}{B}$

(c) $\frac{2\pi m}{qB}$

(d) $\frac{2\pi qB}{m}$

DIRECTIONS: Each of these questions contains an assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(a) If both Assertion and Reason are correct and the Reason is the correct explanation of the Assertion.

(b) If both Assertion and Reason are correct but Reason is not the correct explanation of the Assertion.

(c) If the Assertion is correct but Reason is incorrect.

(d) If the Assertion is incorrect but the Reason is correct.

Q37. **Assertion :** The property that the force with which two charges attract or repel each other are not affected by the presence of a third charge. **[1]**

Reason : Force on any charge due to a number of other charge is the vector sum of all the forces on that charge

Q38. **Assertion:** If a proton and an electron are placed in the same uniform electric field. They experience different acceleration. **[1]**

Reason : Electric force on a test charge is independent of its mass.

Q39. **Assertion:** Long distance power transmission is done at high voltage. **[1]**

Reason : At high voltage supply power losses are less.

Q40. **Assertion :** The alternating current lags behind the emf by a phase angle of $\frac{\pi}{2}$, when AC flows through an inductor. **[1]**

Reason : The inductive reactance increases as the frequency of AC source increases.

Q41. **Assertion :** The induced charge that flows in the circuit does not depends on the time of change of flux. **[1]**

Reason : $i = \frac{dq}{dt} = -\frac{1}{R}\left(\frac{d\phi}{dt}\right) \Rightarrow dq = -\frac{d\phi}{R}$

Q42. **Assertion:** The poles of magnet cannot be separated by breaking into two pieces. **[1]**

Reason: The magnetic moment will be reduced to half when a magnet is broken into two equal pieces

Q43. **Assertion:** A current I flows along the length of an infinitely long straight and thin walled pipe. Then the magnetic field at any point inside the pipe is zero. **[1]**

Reason : $\oint \vec{B} \cdot \overrightarrow{d\ell} = \mu_0 I$ and $\sum I_{in} = 0$

Q44. **Assertion:** A larger dry cell has higher emf. **[1]**

Reason : The emf of a dry cell is proportional to its size.

Q45. **Assertion:** The potential difference between any two points in an electric field depends only on initial and final position. **[1]**

Reason: Electric field is a conservative field so the work done per unit positive charge does not depend on path followed.

Q46. A current carrying coil is subjected to a uniform magnetic field. The coil will orient so that its plane becomes **[1]**

(a) inclined at 45° to the magnetic field

(b) inclined at any arbitrary angle to the magnetic field

(c) parallel to the magnetic field

(d) perpendicular to the magnetic field

Q47. The ratio of mean value over half cycle to r.m.s. value of A.C. is **[1]**

(a) $2:\pi$

(b) $2\sqrt{2}:\pi$

(c) $\sqrt{2}:\pi$

(d) $\sqrt{2}:1$

Q48. A bulb and a capacitor are connected in series to a source of alternating current. If its frequency is increased, while keeping the voltage of the source constant, then bulb will **[1]**

(a) give more intense light

(b) give less intense light

(c) give light of same intensity before

(d) stop radiating light

Q49. The primary winding of a transformer has 100 turns and its secondary winding has 200 turns. The primary is connected to an A.C. supply of 120 V and the current flowing in it is 10 A. The voltage and the current in the secondary are **[1]**

(a) 240 V, 5 A

(b) 240 V, 10 A

(c) 60 V, 20 A

(d) 120 V, 20 A

Section –C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

Q50. If the frequency of an A.C. is made 4 times of its initial value, the inductive reactance will **[1]**

(a) be 4 times

(b) be 2 times

(c) be half

(d) remain the same

Case 1: Electrostatic potential energy of a system of point charges is the total amount of

work done in bringing various charges to their respective positions from infinitely large mutual separations.

If two charges having charge q_1 and q_2 are placed at a distance r from each other, then the potential energy of the system is given by

$$U = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r}$$

The above potential energy is formed due to work done in bringing any one of the charge at the distance r of other charge from infinity so.

$$W = U = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r}$$

51. The potential energy of a system of two charges is negative when **[1]**

(a) both the charges are positive

(b) both the charges are negative

(c) one charge is positive and other is negative

(d) both the charges are separated by in finite distance

Q52. The electric potential at point A is 1 V and at another point B is 5V. A charge 3μC is released from B. What will be the kinetic energy of the charge as it passes through A ? **[1]**

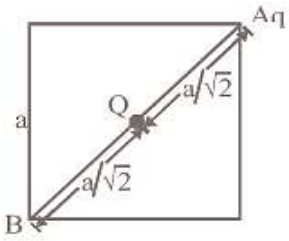
(a) 8×10^{-6} J

(b) 12×10^{-6} J

(c) 12×10^{-9} J

(d) 4×10^{-6} J

Q53. A square of side 'a' has charge Q at its centre and charge ' q ' at one of the corners. The work required to be done in moving the charge ' q ' from the corner to the diagonally opposite corner is **[1]**



(a) zero

(b) $\frac{Qq}{4\pi\epsilon_0 a}$

(c) $\frac{Qq\sqrt{2}}{4\pi\epsilon_0 a}$

(d) $\frac{Qq}{2\pi\epsilon_0 a}$

Q54. When a positive charge q is taken from lower potential to a higher potential point, then **[1]**

its potential energy will

(a) increase (b) decrease

(c) remain unchanged (d) become zero

Q55. If a unit charge is taken from one point to another over an equipotential surface, then **[1]**

(a) work is done on the charge

(b) work is done by the charge

(c) work done on the charge is constant

(d) no work is done