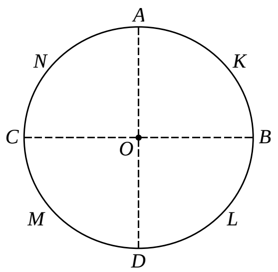
Physics Galaxy
Telegram Test Series

DPYQ NEET Level Practice Test-4 for JEE Main & NEET Aspirants

Topic : ELECTRICITY & MAGNETISM **Time: 90Min** **Marking: +4 –1**

Section - A : All questions are compulsory MCQs

1. A thin conducting ring of radius R is given a charge $+Q$. The electric field at the centre O of the ring due to the charge on the part ANC of the ring is E. The electric field at the centre due to the charge on the part $ABDC$ of the ring is :



(A) E along NO (B) $3E$ along ON
(C) $3E$ along NO (D) E along ON

2. An electron falls from rest through a vertical distance h in a uniform and vertically upward directed electric field E. The direction of electric field is now reversed, keeping its magnitude the same. A helium particle is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall of the helium particle is :
(A) 10 times greater (B) 2 times greater
(C) Smaller (D) Equal

3. A charge q is located at the centre of a cube. The electric flux through any face is :

(A) $\frac{2\pi q}{6(4\pi\varepsilon_0)}$ (B) $\frac{4\pi q}{6(4\pi\varepsilon_0)}$

(C) $\frac{\pi q}{6(4\pi\varepsilon_0)}$ (D) $\frac{q}{6(4\pi\varepsilon_0)}$

4. A small charge Q is enclosed by a Gaussian spherical surface of radius $2R$. If the radius is halved, then the outward electric flux will :
(A) Increase four times (B) Be reduced to half
(C) Remain the same (D) Be doubled

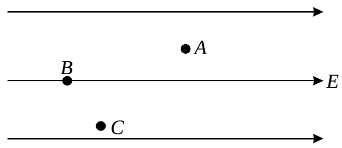
5. What is the flux through a cube of side a if a point charge of q is at one of its corner :

(A) $\frac{2q}{\varepsilon_0}$ (B) $\frac{q}{8\varepsilon_0}$

(C) $\frac{q}{\varepsilon_0}$ (D) $\frac{q}{2\varepsilon_0}6a^2$

6. A ball of mass 20 g is having a charge of 1 μC. Through what potential difference must it be accelerated, starting from rest, to acquire a speed of 2 m/s ?
(A) 8 kV (B) 40 kV
(C) 40 V (D) 80 V

7. A, B and C are three points in a uniform electric field. The electric potential is :



(A) Maximum at A
(B) Minimum at B
(C) Minimum at A
(D) Same at all the three points A, B and C

8. An electric dipole of moment $\vec{p}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by 60° is :

(A) $\sqrt{2}pE$ (B) $\frac{pE}{2}$
(C) $2pE$ (D) pE

9. An electric dipole is placed at an angle of 30° with an electric field intensity 4×10^4 N/C. It experiences a torque equal to 8 Nm. The charge on the dipole, if the dipole length is 8 cm, is :
(A) 8 mC (B) 2 mC
(C) 5 mC (D) 7 μC

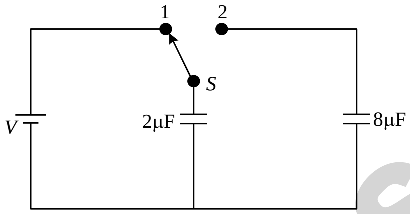
10. Four capacitors each of capacity 16 μF are to be connected in such a way that the effective capacitance is 4 μF. This can be done by :
(A) Connecting all of them in series
(B) Connecting them in parallel
(C) Connecting two in series and one in parallel
(D) Connecting two in parallel and one in series

11. n_1 capacitors in series combination, each of value C_1, is charged by a source of potential difference $2V$. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it has the same (total) energy stored in it, as the first combination has. The value of C_2, in terms of C_1, is then :

(A) $\frac{16C_1}{n_1 n_2}$ (B) $\frac{4C_1}{n_1 n_2}$

(C) $16\frac{n_2}{n_1}C_1$ (D) $2\frac{n_2}{n_1}C_1$

12. A capacitor of 4 μF is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is approx :



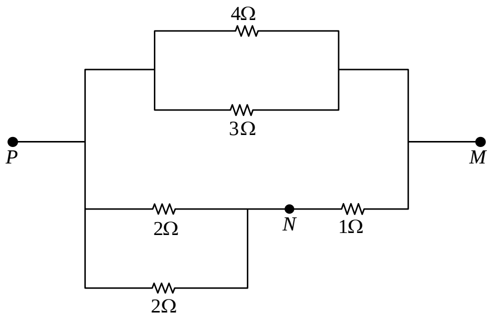
(A) 0% (B) 50%
(C) 67% (D) 80%

13. A parallel plate capacitor of capacitance 40 μF is being charged by a voltage source whose potential is changing at the rate of 5 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively :
(A) Zero, 200 μA (B) 200 μA, 200 μA
(C) 200 μA, zero (D) Zero, zero

14. A wire of resistance 2 Ω is stretched to thrice its original length. The resistance of stretched wire would be :
(A) 2 Ω (B) 4 Ω
(C) 18 Ω (D) 16 Ω

15. For a cell terminal potential difference is 2 V when circuit is open and reduces to 1.5 V when cell is connected to a resistance of R = 5 Ω. Determine internal resistance of cell (r) :
(A) 10/9 Ω (B) 9/10 Ω
(C) 11/9 Ω (D) 5/3 Ω

16. In the circuit shown, the current through the 4 Ω resistor is 1 A when the points P and M are connected to a DC voltage source. The potential difference between the points M and N is :

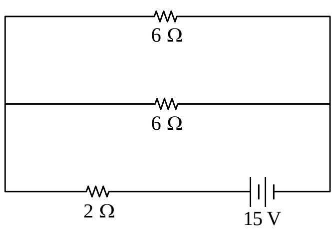


(A) 0.5 volt (B) 3.2 volt
(C) 1.5 volt (D) 2.0 volt

17. The resistances of the four arms P, Q, R and S in a balanced bridge are 2 ohm, 3 ohm, 6 ohm and 9 ohm, respectively. The e.m.f. and internal resistance of the cell are 8 volt and 0.25 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be :
(A) 1.0 A (B) 0.2 A
(C) 0.1 A (D) 2.0 A

18. The equivalent resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is 2 Ω. What will be the effective resistance if they are connected in series ?
(A) 2 Ω (B) 32 Ω
(C) 1 Ω (D) 4 Ω

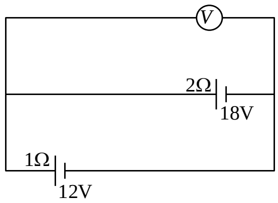
19. The total power dissipated in watts in the circuit shown here is :



(A) 40 (B) 54
(C) 45 (D) 16

20. A galvanometer of 100 ohm resistance has 50 divisions. A current of 2×10^{-4} ampere gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of 100 volts, it should be connected with a resistance of :
(A) 9900 Ω as a shunt (B) 2450 Ω as a shunt
(C) 9900 Ω as a series (D) 2450 Ω as a series

21. Two batteries, one of emf 18 volts and internal resistance 2 Ω and the other of emf 12 volt and internal resistance 1 Ω, are connected as shown. The voltmeter *V* will record a reading of :



(A) 18 volt (B) 30 volt
(C) 14 volt (D) 15 volt

22. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4 m long. When the resistance, *R*, connected across the given cell, has values of (i) Infinity (ii) 9 Ω, the 'balancing lengths', on the potentiometer wire are found to be 3 m and 1.5 m, respectively. The value of internal resistance of the cell is :
(A) 90 Ω (B) 0.09 Ω
(C) 0.9 Ω (D) 9 Ω

23. A straight current carrying wire of radius *a* carries a steady current *I*. The current is uniformly distributed over its cross-section. The ratio of the magnetic fields *B* and *B′* at radial distances *a*/4 and 2*a* respectively, from the axis of the wire is :
(A) 1/4 (B) 1/2
(C) 1 (D) 4

24. The magnetic force acting on a charged particle of charge – 4 μc in a magnetic field of 5*T* acting in *y* direction, when the particle velocity is $(2\hat{i}+3\hat{j}) \times 10^6\ ms^{-1}$, is :
(A) 40 N in *z* direction (B) 40 N in *z* – direction
(C) 4 N in *z* direction (D) 40 N in *y* direction

25. A electron carrying 4 MeV kinetic energy is moving in a circular path of radius *R* in uniform magnetic field. What should be the energy of an α-particle to describe a circle of same radius in the same field ?
(A) 1 MeV (B) 0.5 MeV
(C) 4 MeV (D) 2 MeV

26. A rectangular coil of area 0.24 m^2 having 100 turns of wire is suspended vertically in a uniform magnetic field of strength 0.2 Wb/m^2. The coil carries a current of 2 A. If the plane of the coil is inclined at an angle of 60º with the direction of the field, the torque required to keep the coil in stable equilibrium will be :
(A) 4.8 Nm (B) 0.15 Nm
(C) 0.20 Nm (D) 0.24 Nm

27. A conducting rod of mass per unit length 1 kg m^{-1} is lying horizontally on a smooth inclined plane which makes an angle of 60º with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction 1.732 T is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is (g = 10 m/s^2):
(A) 14.76 A (B) 10 A
(C) 20 A (D) 11.32 A

28. A uniform conducting wire of length 24*a* and resistance *R* is wound up as a current carrying coil in the shape of,
(i) an equilateral triangle of side *a*.
(ii) a square of side *a*.
The magnetic dipole moments of the coil in each case respectively are :
(A) $\sqrt{3}Ia^2$ and $3\,Ia^2$ (B) $2\sqrt{3}\ Ia^2$ and $6\,Ia^2$
(C) $3\,Ia^2$ and $4\,Ia^2$ (D) $4\,Ia^2$ and $3\,Ia^2$

29. A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2 s in earth's horizontal magnetic field of 24 μT. When a horizontal field of 12 microtesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be :
(A) 4 s (B) 1 s
(C) 2 s (D) 2.82 s

30. A circular disc of diameter 0.4 metre is placed in a uniform magnetic field of induction $\frac{1}{\sqrt{3}\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 30º with $\vec{B}$. The magnetic flux linked with the disc is :
(A) 0.08 Wb (B) 0.01 Wb
(C) 0.02 Wb (D) 0.06 Wb

31. Two coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 5t$, where ϕ is in webers, *t* is time in seconds and ϕ_0 is a constant, the output voltage across the secondary coil is :
(A) 120 volts (B) 220 volts
(C) 30 volts (D) 150 volts

32. A solenoid has 1000 turns. When a current of 5 ampere is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 2×10^{-3} Wb. The self-inductance of the solenoid is :
(A) 1.0 henry (B) 0.4 henry
(C) 2.5 henry (D) 2.0 henry

33. Alternating voltage in a circuit is $e = 100\sqrt{2}\sin 100t$ volts is connected to a capacitor of capacity 2 μF. The *rms* value of the current in the circuit is :

(A) 10 mA (B) 100 mA

(C) 200 mA (D) 20 mA

34. A 200 Ω resistance and a capacitor of 200 Ω reactance are connected in series across a 200 V source. When the capacitor is 50 % charged, the peak value of the displacement current is :

(A) 0.707 A (B) 1 A

(C) 1.414 A (D) $11\sqrt{2}$ A

35. An inductive coil of 30 Ω has a resistance of 12 Ω. It is placed in series with a condenser of capacitive reactance 25 Ω. The combination is connected to an AC source of 110 V. The power factor of the circuit is :

(A) 0.56 (B) 0.64

(C) 0.80 (D) 0.92

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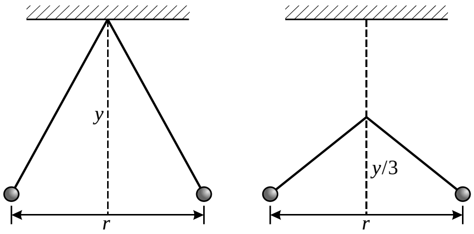
Section - B : In actual NEET paper you will be given choice to attempt any 10 out of 15 questions in this section but for this test paper, students are advised to solve all question to compare their preparation with the provided benchmarking

1. Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r. Now the strings are rigidly clamped at one-third of the height. The equilibrium separation between the balls now become :



(A) $\left(\frac{1}{\sqrt{2}}\right)^2$ (B) $\left(\frac{r}{\sqrt[3]{2}}\right)$

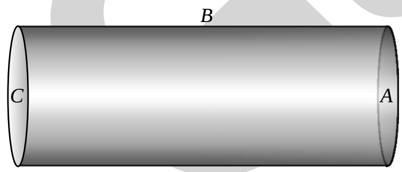
(C) $\left(\frac{r}{3\sqrt{3}}\right)$ (D) $\left(\frac{2r}{3}\right)$

2. Two parallel infinite line charges with linear charge densities $+\lambda$ C/m and $-\lambda$ C/m are placed at a distance of R in free space. What is the electric field mid-way between the two line charges ?

(A) Zero (B) $\frac{2\lambda}{\pi\varepsilon_0 R}$ N/C

(C) $\frac{\lambda}{\pi\varepsilon_0 R}$ N/C (D) $\frac{\lambda}{2\pi\varepsilon_0 R}$ N/C

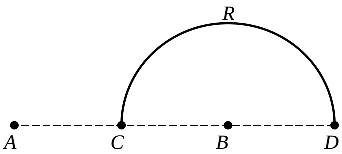
3. A hollow cylinder has a charge q coulomb within i. If ϕ' is the electric flux in units of volt-meter associated with the curved surface A, the flux linked with the plane surface B in units of volt-meter will be :



(A) $\frac{q}{2\varepsilon_0}$ (B) $\frac{\phi'}{3}$

(C) $\frac{q}{\varepsilon_0} - 2\phi'$ (D) $\frac{1}{2}\left(\frac{q}{\varepsilon_0} - \phi'\right)$

4. Charges $+q$ and $-q$ are placed at points B and A respectively which are a distance $4L$ apart, C is the midpoint between A and B. The work done in moving a charge $+Q$ along the semicircle CRD is :



(A) $\frac{qQ}{12\pi\varepsilon_0 L}$ (B) $\frac{qQ}{6\pi\varepsilon_0 L}$

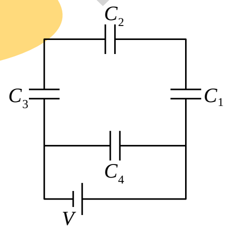
(C) $-\frac{qQ}{6\pi\varepsilon_0 L}$ (D) $\frac{qQ}{4\pi\varepsilon_0 L}$

5. The potential in a region is represented by $V(x, y, z) = 6x - 8xy + 6yz$, where V is in volts and x, y, z are in metres. The electric force experienced by a charge of 2 coulomb situated at point (1, 1, 1) is :

(A) $6\sqrt{5}$ N (B) 30 N

(C) $\sqrt{11}$ N (D) $4\sqrt{11}$ N

6. A network of four capacitors of capacity equal to $C_1 = C_2 = C_3 = C_4 = C$ are connected to a battery as shown in the figure. The ratio of the charges on C_2 and C_4 is :



(A) $\frac{7}{4}$

(B) $\frac{4}{3}$

(C) $\frac{3}{22}$

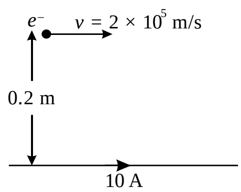
(D) $\frac{1}{3}$

7. An electric heating device has two heating coils. When one of the coils is connected to an a.c. source, the water in the kettle boils in 5 minutes. When the other coil is used the water boils in 20 minutes. If both the coils are connected in parallel, the time taken by the same quantity of water to boil will be :

(A) 8 min (B) 4 min

(C) 25 min (D) 15 min

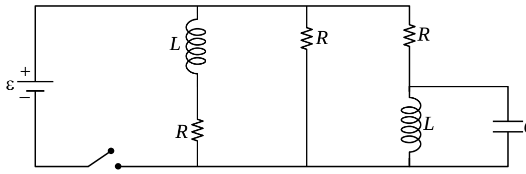
8. An infinitely long straight current carrying conductor carries a current of 10 A as shown. An helium particle is moving with a speed of 2×10^5 m/s parallel to the conductor. The perpendicular distance between the helium particle and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant :



(A) 64×10^{-20} N (B) $8\pi \times 10^{-20}$ N

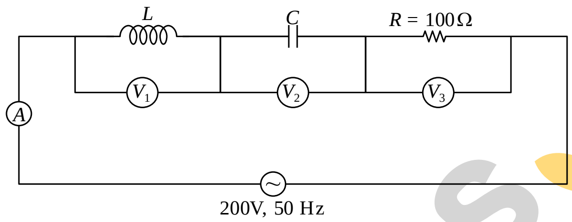
(C) $4\pi \times 10^{-20}$ N (D) 8×10^{-20} N

9. Given circuit contains three identical resistors with resistance R = 6.0 Ω each, two identical inductors with inductance L = 5.0 mH each, and an ideal battery with *emf* ε = 18 V. The current '*i*' through the battery just after the switch closed is :



(A) 6 mA (B) 0.6 A
(C) 6 A (D) 0 ampere

10. According to shown circuit the reading of voltmeter V_1 and V_2 are 500 V each. The reading of the voltmeter V_3 and ammeter A are respectively :



(A) 200 V, 2.0 A (B) 150 V, 2.2 A
(C) 220 V, 2.2 A (D) 220 V, 2.0 A

11. Two point objects A and B, having charges $+Q$ and $-Q$ respectively, are placed at certain distance apart and force acting between them is F. If 50% charge of A is transferred to B, then force between the objects becomes :

(A) F (B) $\frac{9F}{16}$
(C) $\frac{16F}{9}$ (D) $\frac{F}{4}$

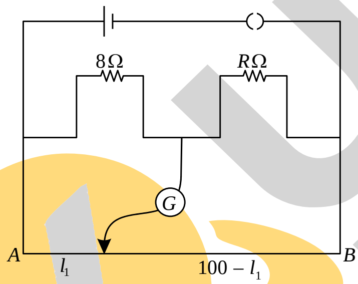
12. Sixty four drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop :

(A) 660 V (B) 3520 V
(C) 1520 V (D) 1980 V

13. A 12 volt battery is connected to the terminals of a three metre long wire of uniform thickness and resistance of 300 ohm. The difference of potential between two points on the wire separated by a distance of 40 cm will be :

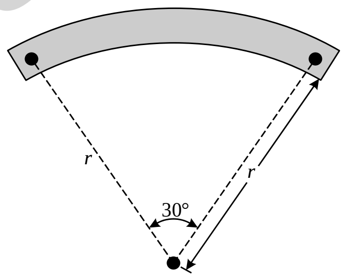
(A) 2 volt (B) 3 volt
(C) 1 volt (D) 1.6 volt

14. In a meter bridge two resistances are 8 Ω and R Ω, respectively. When the resistance R is shunted with an equal resistance, the new balance point is at 1.6 l_1. The resistance R, is :



(A) 10 Ω (B) 15 Ω
(C) 20 Ω (D) 24 Ω

15. A bar magnet of length l and magnetic dipole moment M is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be :



(A) M (B) $\frac{3}{\pi}M$
(C) $\frac{6}{\pi}M$ (D) $\frac{M}{2}$

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DPYQ NEET Level Practice Test-4 for JEE Main & NEET Aspirants

ANSWER KEY

SECTION-A

1. (D)	**2.** (C)	**3.** (B)	**4.** (C)
5. (B)	**6.** (B)	**7.** (C)	**8.** (B)
9. (C)	**10.** (A)	**11.** (B)	**12.** (C)
13. (B)	**14.** (C)	**15.** (D)	**16.** (D)
17. (D)	**18.** (B)	**19.** (C)	**20.** (C)
21. (C)	**22.** (C)	**23.** (B)	**24.** (B)
25. (C)	**26.** (A)	**27.** (B)	**28.** (B)
29. (D)	**30.** (C)	**31.** (D)	**32.** (B)
33. (D)	**34.** (B)	**35.** (D)	

SECTION-B

1. (C)	**2.** (B)	**3.** (C)	**4.** (A)
5. (D)	**6.** (D)	**7.** (B)	**8.** (A)
9. (C)	**10.** (A)	**11.** (B)	**12.** (B)
13. (D)	**14.** (D)	**15.** (C)	