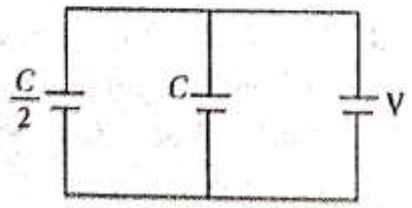
SATISH SCIENCE ACADEMY

Where We Shape The Career **Time :45Min.**

MARKS:50 **PHYSICS MOCK TEST 02** **No. MCQ:50**

1. **If α is the coefficient of performance of a refrigerator and ' Q_1 ' is heat released to the hot reservoir, then the heat extracted from the cold reservoir ' Q_2 ' is**
(a) $\frac{\alpha Q_1}{\alpha-1}$ (b) $\frac{\alpha-1}{\alpha} Q_1$
(c) $\frac{\alpha Q_1}{1+\alpha}$ (d) $\frac{1+\alpha}{\alpha} Q_1$
2. **In a adiabatic process, relation between ΔU and ΔW is**
(a) $\Delta U=\Delta W$ (b) $\Delta U=-\Delta W$
(c) $\Delta U=-\Delta W+\Delta Q$ (d) $\Delta Q=\Delta W$
3. **A gas at N.T.P. is suddenly compressed to one-fourth of its original volume. If $\gamma=1.5$, then the final pressure is**
(a) 4 times (b) 1.5 times
(c) 8 times (d) $\frac{1}{4}$ times
4. **A gas is compressed at a constant pressure of $50 \mathrm{~N/m^2}$ from a volume of $10 \mathrm{~m^3}$ to a volume of $4 \mathrm{~m^3}$. Energy of 100 J is then added to the gas by heating. Its internal energy is**
(a) increased by 400 J
(b) increased by 200 I
(c) increased by 100 J
(d) decreased by 200I
5. **If a star emitting yellow light is accelerated towards earth, then to an observer on earth it will appear**
(a) becoming orange
(b) shining yellow
(c) gradually changing to blue
(d) gradually changing to red.
6. **A telescope has large diameter of the objective. Then its resolving power is**
(a) independent of the diameter of the objective
(b) low
(c) zero
(d) high.
7. **In Young's double slit experiment, 8^{th} maximum with wavelength ' λ_1 ' is at distance ' d_1 ' from the central maximum and 6^{th} maximum with wavelength ' λ_2 ' is at a distance ' d_2. Then $\frac{d_2}{d_1}$ is**
(a) $\frac{3\lambda_1}{4\lambda_2}$ (b) $\frac{3\lambda_2}{4\lambda_1}$
(c) $\frac{4\lambda_1}{3\lambda_2}$ (d) $\frac{4\lambda_2}{3\lambda_1}$
8. **If I_0 is the intensity of the principal maximum in the single slit diffraction pattern, then what will be the intensity when the slit width is doubled?**
(a) $\frac{I_0}{2}$ (b) I_0
(c) $4I_0$ (d) $2I_0$
9. **On placing a thin film of mica of thickness 12×10^{-5} cm in the path of one of the interfering beams in Young's double slit experiment using monochromticlight, the fringe patternshifts through a distance equal to the width of bright fringe. If $\lambda=6\times10^{-5}$ cm, the refractive index of mica is**
(a) 1.1 (b) 1.3
(c) 1.5 (d) 1.4
10. **In a single slit experiment, the width of the slit is doubled. Which one of the following statements is correct?**
(a) The intensity and angular width of the central maximum are unaffected.
(b) The intensity remains same and angular width becomes half.
(c) The intensity and angular width both are doubled.
(d) The intensity increases by a factor 4 and the angular width decreases by a factor of $\frac{1}{2}$.
11. **The difference in the effective capacity of two similar capacitors when joined in series and then in parallel is 6μF. The capacity of each capacitor is**
(a) 2μF (b) 4μF
(c) 8μF (d) 16μF
12. **A parallel plate air capacitor has capacity C farad, potential V volt and energy E joule. When the gap between the plates is completely filled with dielectric**
(a) both V and E increase
(b) Both V and E decrease
(c) V decreases, E increases
(d) V increases, E decreases
13. **A parallel plate air filled capacitor of capacitance ' C ' has plate area ' A ' and the distance between the plates ' d '. When a metal sheet of thickness $\left(\frac{d}{2}\right)$ and of the same area ' A ' is introduced between the plates, its capacitance becomes ' C_2 '. The ratio $C_2: C_1$ is**
(a) 2: 1 (b) 3: 2
(c) 4: 1 (d) 3: 1
14. **An uncharged capacitor is connected to a battery. While charging the capacitor, how much is the energy lost, from the energy supplied by the battery?**
(a) 50% (b) 75%
(c) 100% (d) 25%

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



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

16. The charges $2q, -q, -q$ are located at the vertices of an equilateral triangle. At the circumference of the triangle

(a) the field is zero but potential is not zero.

(b) the field is non-zero but the potential is zero.

(c) both field and potential are zero.

(d) both, field and potential are non-zero.

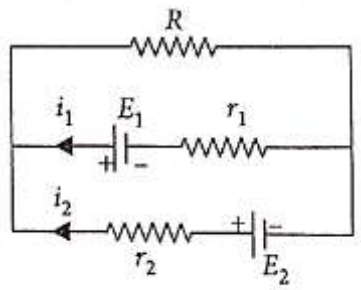
17. A charge 17.7×10^{-4} C is distributed uniformly over a large sheet of area $200\ m^2$. The electric intensity at a distance 20 cm from it in air will be $[\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/Nm^2]$

(a) 5×10^5 N/C (b) 6×10^5 N/C
(c) 7×10^5 N/C (d) 8×10^5 N/C

18. A solid metallic sphere has a charge $+3Q$. Concentric with this sphere is a conducting spherical shell having charge $-Q$. The radius of the sphere is 'A' and that of the spherical shell is 'B' $(B > A)$. The electric field at a distance 'R' $(A < R < B)$ from the centre is (ε_0 = permittivity of vacuum)

(a) $\frac{Q}{2\pi\varepsilon_0 R}$ (b) $\frac{3Q}{2\pi\varepsilon_0 R}$
(c) $\frac{3Q}{4\pi\varepsilon_0 R^2}$ (d) $\frac{4Q}{2\pi\varepsilon_0 R^2}$

19. In the given electrical circuit, which one of the following equation is a correct equation?



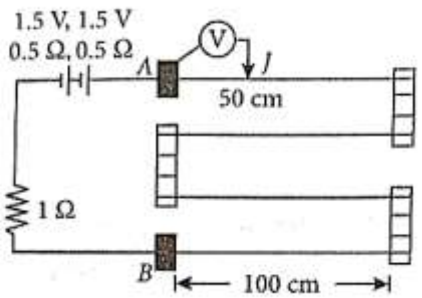
(a) $E_2 - i_2 r_2 - E_1 - i_1 r_1 = 0$

(b) $E_1 - (i_1 + i_2)R + i_1 r_1 = 0$

(c) $E_1 - (i_1 + i_2)R - i_1 r_1 = 0$

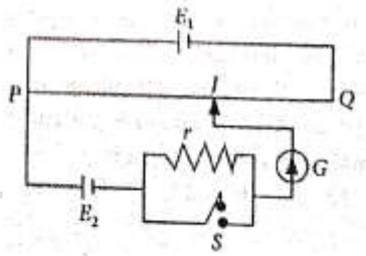
(d) $-E_2 - (i_1 + i_2)R + i_2 r_2 = 0$

20. In the circuit shown, a four-wire potentiometer is made of a 400 cm long wire, which extends between A and B. The resistance per unit length of the potentioneter wire is $r = 0.01\Omega$/cm. If an ideal voltmeter is connected as shown with jockey J at 50 cm from end A, the expected reading of the voltmeter will be



(a) 0.25 V (b) 0.20 V
(c) 0.50 V (d) 0.75 V

21. A potentiometer wire PQ of 1 m length is conneted to a standard cell E_1. Another cell E_2 of emi 1.02 V is connected with a resistance 'r' and switch S (as shown in figure). With switch S open, the null position is obtained at a distance of 49 cm from Q. The potential gradient in the potentiometer wire is



(a) 0.03 V/cm (b) 0.02 V/cm
(c) 0,01 V/cm (d) 0.04 V/cm

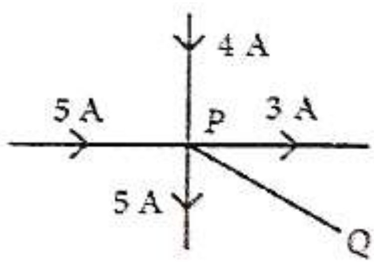
22. To determine the internal resistance of a cell by using a potentiometer the null point is at 1 m when the cell is shunted by 3Ω resistance and at a length 1.5 m. When cell is shunted by 6Ω resistance, the internal resistance of the cell is

(a) 4Ω (b) 8Ω
(c) 3Ω (d) 6Ω

23. An ammeter of resistance 'R' gives a full scale deflection when a current of 2 A passes through. it. If it is to measure maximum current of 10 A, the required shunt is

(a) $\frac{R}{4}$ (b) R
(c) $2R$ (d) $\frac{R}{2}$

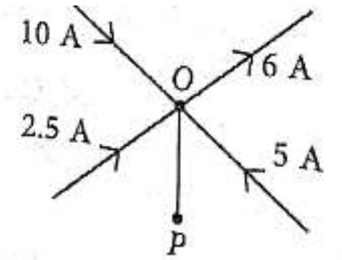
24. Five current carrying conductors meet at point P. What is the magnitude and direction of the current in conductor PQ?



(a) 1 A from Q to P (b) 1 A from P to Q
(c) 3 A from P to Q (d) 2 A from Q to P

25. A wire of length 3 m connected in the left gap of a meter-bridge balances 8Ω resistance in the right gap at a point, which divides the bridge wire in the ratio 3: 2. The length of the wire corresponding to resistance of 1Ω is
(a) 1 m (b) 0.75 m
(c) 0.5 m (d) 0.25 m

26. Hive current carrying conductors meet at a point ' O ' as shown in figure. The magnitude and direction of the current in conductor ' OP ' is



(a) 6.5 A from O to P (b) 9 A from P to O
(c) 10.5 A from P to O (d) 11.5 A from O to P

27. A circular coil carrying current ' l ' has radius ' R ' and magnetic field at the centre is ' B '. At what distance from the centre along the axis of the same coil, the magnetic field will be $\frac{B}{8}$?
(a) $R\sqrt{2}$ (b) $R\sqrt{3}$
(c) $2R$ (d) $3R$

28. A current of 1 A is flowing on the sides of an equilateral triangle of side 4.5×10^{-2} m. The magnetic field at the centre of the triangle will be
(a) 4×10^{-5} Wb/m^2
(b) 8×10^{-5} Wb/m^2
(c) 2×10^{-5} Wb/m^2
(d) Zero

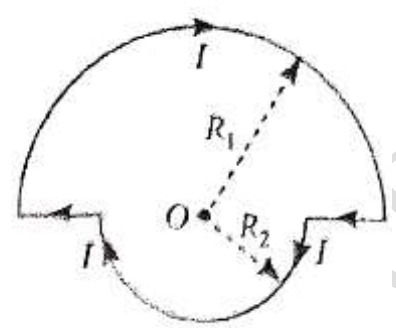
29. A long solenoid has 200 turns per cm and carriers a current i. The magnetic field at its centre is 6.28×10^{-2} Wb/m^2. Another long solenoid has 100 turns per cm and it carries a current $i/3$. The value of magnetic field at its centre is nearly
(a) 1.05×10^{-3} Wb/m^2
(b) 1.05×10^{-5} Wb/m^2
(c) 1.05×10^{-4} Wb/m^2
(d) 1.05×10^{-2} Wb/m^2

30. The electric current in a circular coil of 2 turns produces a magnetic induction B_1 at its centre. The coil is unwound and is rewound into a circular coil of 5 turns and the same current produces a magnetic induction B_2 at its centre. The ratio of $\frac{B_2}{B_1}$
(a) $\frac{5}{2}$ (b) $\frac{25}{4}$
(c) $\frac{5}{4}$ (d) $\frac{25}{2}$

31. A bar magnet having a magnetic moment of 2.0×10^5 JT^{-1}, is placed along the direction of uniform magnetic field of magnitude $B=14\times10^{-5}$ T. The work done in rotating the magnet slowly through 60° from the direction of field is
(a) 14 J (b) 8.4 J
(c) 4 J (d) 1.4 J

32. A straight wire carrying a current (I) is turned into a circular loop. If the magnitude of the magnetic moment associated with it is ' M ', then the length of the wire will be
(a) $\frac{M\pi}{4I}$ (b) $\left[\frac{4\pi I}{M}\right]^{\frac{1}{2}}$
(c) $\left[\frac{4M\pi}{I}\right]^{\frac{1}{2}}$ (d) $4\pi MI$

33. Figure shows two semicircular loops of radii R_1 and R_2 carrying current t. The magnetic field at the common centre ' O ' is



(a) $\frac{\mu_0 I}{4}\left(\frac{1}{R_1}+\frac{1}{R_2}\right)$ (b) $\frac{\mu_0 l}{4}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$
(c) $\frac{\mu_0 I}{2\pi}\left(\frac{1}{R_1}+\frac{1}{R_2}\right)$ (d) $\frac{\mu_0 I}{2\pi}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

34. A long wire is bent into a circular coil of one turn and then into a circular coil of smaller radius having n turns. If the same current passes in both the cases, the ratio of magnetic fields produced at the centre for one turn to that of n turns is
(a) $1: n$ (b) $n: 1$
(c) $1: n^2$ (d) $n^2:1$

35. An iron rod is placed parallel to magnetic field of intensity 2000 A/m. The magnetic flux through the rod is 6×10^{-4} Wb and its cross-sectional area is 3 cm^2. The magnetic permeability of the rod in Wb/A– m is
(a) 10^{-1} (b) 10^{-2}
(c) 10^{-3} (d) 10^{-4}

36. The magnetic moment of electron due to orbital motion is proportional to ($n=$ principle quantum number)
(a) $\frac{1}{n^2}$ (b) $\frac{1}{n}$
(c) n^2 (d) n

37. If $M_z=$ magnetization of a paramagnetic sample, $B=$ external magnetic field, $T=$ absolute temperature, $C=$ curie constant. Then according to Curie's law in magnetism, the correct relation is
(a) $M_z=\frac{T}{CB}$ (b) $M_z=\frac{CB}{T}$
(c) $C=\frac{M_zB}{T}$ (d) $C=\frac{T^2}{M_zB}$

38. Magnetic susceptibility (χ) for a paramagnetic and diamagnetic materials is respectively
(a) small, positive and small, positive
(b) large, positive and small, negative
(c) small, positive and small, negative
(d) large, negative and large, positive.

39. If M_0 and L_0 denote the magnetic moment and angular momentum of the electron due to its orbital motion respectively, then the gyromagnetic ratio is given by

(a) $\frac{L_0}{M_0}$ (b) $L_0 M_0$

(c) $\frac{M_0}{L_0}$ (d) $\sqrt{\frac{M_0}{L_0}}$

40. In the hysteresis curve the value of magnetization (B) which will be present in a substance when value of magnetizing force (H) is made zero $(H=0)$ is called as

(a) coercivity (b) domain

(c) retentivity (d) saturation

41. Magnetic flux passing through a coil is initially 4×10^{-4} Wb. It reduces to 10% of its original value in t second. If the e.m.f. induced is 0.72 mV then t in second is

(a) 0.3 (b) 0.4

(c) 0.5 (d) 0.6

42. Two coils P and Q are kept near each other. When no current flows through coil P and current increases in coil Q at the rate 10 A/s, the e.m.f. in coil P is 15mV. When coil Q carries no current and current of 1.8 A flows through coil P, the magnetic flux linked with the coil Q is

(a) 1.4mWb (b) 2.2mWb

(c) 2.7mWb (d) 2.9mWb

43. If flux is given as $\phi = 3t^2 + 4t + 8$. Then find the induced emf at $t = 2s$

(a) 16 V (b) 12 V

(c) 8 V (d) 4 V

44. The self inductance ' L ' of a solenoid of length ' l ' and area of cross-section ' A ' with a fixed number of turns ' N, increases as

(a) l decreases and A increases

(b) both l and A decrease

(c) both l and A increase

(d) l increases and A decreases.

45. The self induction (L) produced by solenoid of length ' l ' having ' N ' number of turns and cross sectional area ' A ' is given by the formula ($\phi =$ magnetic flux, $\mu_0 =$ permeability of vacuum)

(a) $L = N\phi$ (b) $L = \mu_0 NAl$

(c) $L = \frac{\mu_0 N^2 A}{l}$ (d) $L = \frac{\mu_0 NA}{l}$

46. Assuming the expression for the pressure exerted by the gas on the walls of the container, it can be shown that pressure is

(a) $\left[\frac{1}{3}\right]^{rd}$ kinetic energy per unit volume of a gas

(b) $\left[\frac{2}{3}\right]^{rd}$ kinetic energy per unit volume of a gas

(c) $\left[\frac{3}{4}\right]^{th}$ kinetic energy per unit volume of a gas

(d) $\frac{3}{2} \times$ kinetic energy per unit volume of a gas

47. If ' C_p' and C_v, are molar specific heats of an ideal gas at constant pressure and volume respectively. If ' λ ' is ratio of two specific heats and ' R ' is universal gas constant then ' C_p ' is equal to

(a) $\frac{R\gamma}{\gamma-1}$ (b) γR

(c) $\frac{1+\gamma}{1-\gamma}$ (d) $\frac{R}{\gamma-2}$

48. If the absolute temperature of a gas is increased 5 times, the r.m.s. velocity of the gas molecules will be

(a) 10 times (b) 5 times

(c) $\sqrt{5}$ times (d) 25 times

49. According to kinetic theory of gases, which one of the following statements is wrong?

(a) All the molecules of a gas are identical.

(b) Collisions between the molecules of a gas and that of the molecules with the walls of the container are perfectly elastic.

(c) The molecules do not exert appreciable force on one another except during collision.

(d) The pressure exerted by a gas is due to the collision between the molecules of the gas.

50. The pressure exerted by an ideal gas at a particular temperature is directly proportional to

(a) the mean speed of the gas molecules

(b) mean of the square of the speed of the gas molecules

(c) the square of the mean speed of the gas molecules

(d) the root mean square speed of the gas molecules.