SUPER 10

CBSE Class 12 PHYSICS

2021-22 Term I Sample Papers with **OMR Sheets**

disha Publication Inc

Highlights

- 10 Fully Solved Sample Papers with Marking Scheme
- CBSE Sample Paper 2021 with Solutions
- Objective Qns. & Solns. CBSE Sample 2020 - 21
- Objective Qns. & Solns. 2020 Solved Paper
- Latest Revised CBSE Syllabus for 2021-22 (issued on 28-07-2021)
- Covers all new variety Qns - A/R, Case base & MCQs etc.
- Separate OMR Answer Sheet for each Sample Paper

Based on the Pattern of Sample Paper issued by CBSE on 2nd Sep, 2021

Corporate Office

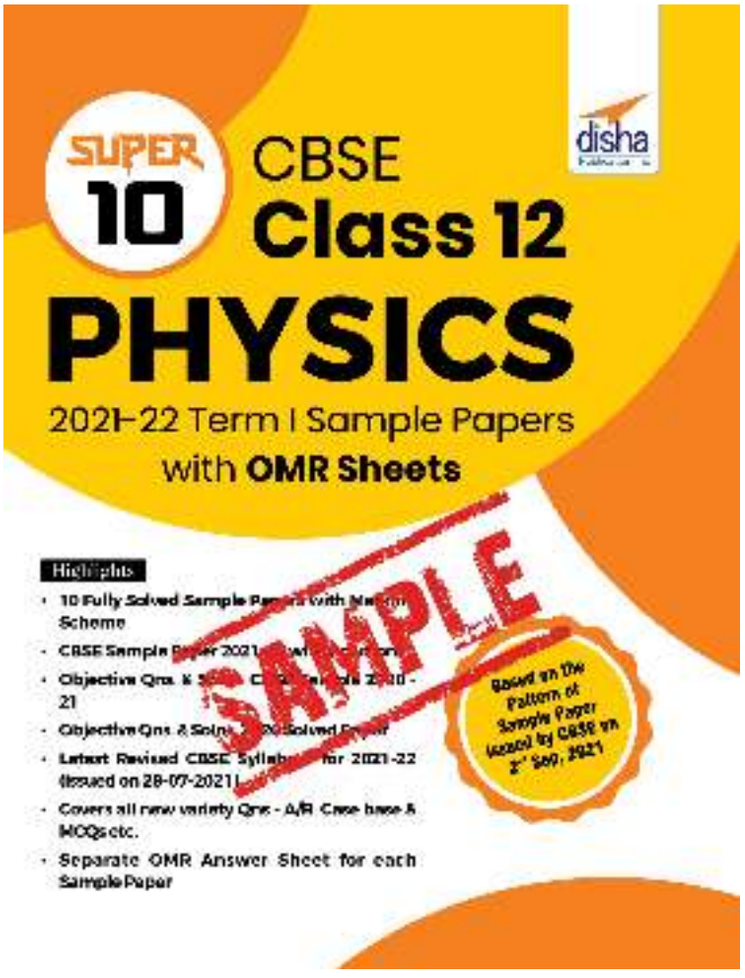
DISHA PUBLICATION
45, 2nd Floor, Maharishi Dayanand Marg,
Corner Market, Malviya Nagar, New Delhi - 110017
Tel : 49842349 / 49842350

By
Govind Thakur

Typeset by Disha DTP Team

CONTENTS OF FREE SAMPLE BOOK

This sample book is prepared from the book **"Super 10 CBSE Class 12 Physics 2021-22 Term I Sample Papers with OMR Sheets".**



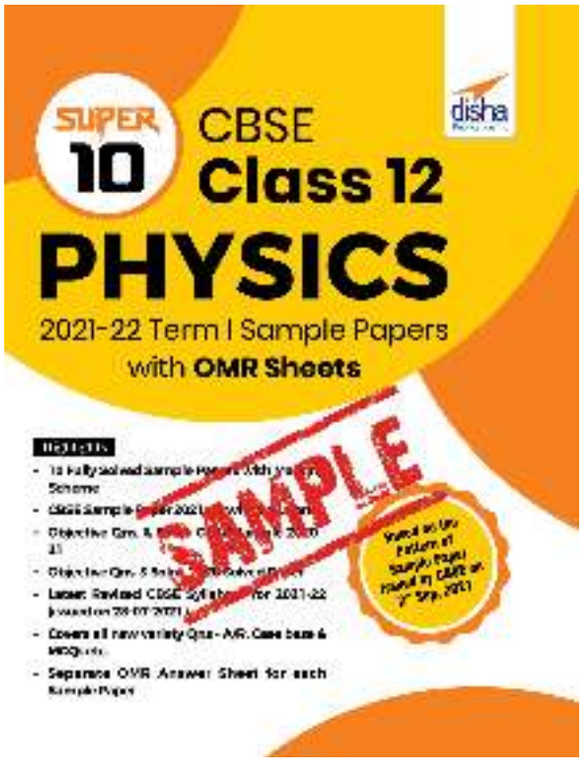
ISBN - 9789390711611

MRP- 170/-

In case you like this content, you can buy the **Physical Book** or **E-book** using the ISBN provided above.

The book & e-book are available on all leading online stores.

CONTENTS OF COMPLETE BOOK



Sample Paper

1

Time : 90 Minutes **Max. Marks : 35**

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.*

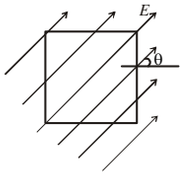
1. A body is positively charged, it implies that
(a) there is only positive charge in the body
(b) there is positive as well as negative charge in the body but the positive charge is more than negative charge
(c) there is equal positive and negative charge in the body but the positive charge lies in the outer regions
(d) negative charge is displaced from its position

2. In a region of constant potential
(a) the electric field is uniform
(b) the electric field is zero
(c) the electric field shall necessarily change if a charge is placed outside the region
(d) None of these

3. A dielectric slab is inserted between the plates of an isolated charged capacitor. Which of the following quantities remain unchanged ?
(a) The charge on the capacitor
(b) The stored energy in the Capacitor
(c) The potential difference between the plates
(d) The electric field in the capacitor

4. The electrostatic potential energy of a system of two charges is negative when
(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 infinite distance

5. A square surface of side L meter in the plane of the paper is placed in a uniform electric field E (volt/m) acting along the same plane at an angle θ with the horizontal side of the square as shown in Figure. The electric flux linked to the surface, in units of volt. m, is



(a) EL^2
(b) $EL^2 \cos\theta$
(c) $EL^2 \sin\theta$
(d) zero

6. 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
(a) $E_e = 2E_a$
(b) $E_a = 2E_e$
(c) $E_a = E_e$
(d) None of these

7. On moving a charge of 20 coulomb by 2 cm, 2 J of work is done, then the potential difference between the points is
(a) 0.1 V (b) 8 V (c) 2 V (d) 0.5 V.

8. If the resistance of a conductor is 5Ω at 50°C & 7Ω at 100°C, then mean temperature coefficient of resistance (of material) is
(a) 0.013/°C (b) 0.004/°C (c) 0.006/°C (d) 0.008/°C

9. To draw a maximum current from a combination of cells, how should the cells be grouped?
(a) Parallel (b) Series (c) Mixed grouping
(d) Depends upon the relative values of internal and external resistances

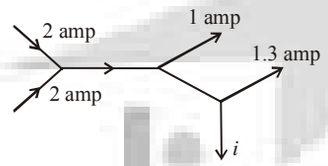
10. Sensitivity of potentiometer can be increased by
(a) increasing the e.m.f of the cell (b) increasing the length of the potentiometer
(c) decreasing the length of the potentiometer wire (d) None of these

11. Forty electric bulbs are connected in series across a 220 V supply. After one bulb is fused the remaining 39 are connected again in series across the same supply. The illumination will be
(a) more with 40 bulbs than with 39 (b) more with 39 bulbs than with 40
(c) equal in both the cases (d) in the ratio $40^2 : 39^2$

12. Two resistors A and B have resistances R_A and R_B respectively with $R_A < R_B$. The resistivities of their materials are ρ_A and ρ_B. Then
(a) $\rho_A > \rho_B$ (b) $\rho_A = \rho_B$ (c) $\rho_A < \rho_B$
(d) insufficient information to predict relation

13. Kirchhoff's first law, *i.e.*, $\Sigma i = 0$ at a junction, deals with the conservation of
(a) charge (b) energy (c) momentum (d) angular momentum

14. The figure below shows currents in a part of electric circuit. The current i is



(a) 1.7 amp
(b) 3.7 amp
(c) 1.3 amp
(d) 1 amp

15. 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
(a) Bq/mv (b) mq/Bv (c) mB/qv (d) mv/Bq

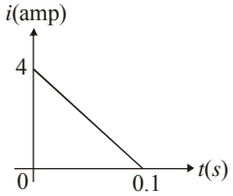
16. Magnetic field intensity at the centre of a coil of 50 turns, radius 0.5 m and carrying a current of 2 A is
(a) 0.5×10^{-5} T (b) 1.25×10^{-4} T (c) 3×10^{-5} T (d) 4×10^{-5} T

17. A moving coil galvanometer has N number of turns in a coil of effective area A, it carries a current I. The magnetic field B is radial. The torque acting on the coil is
(a) NA^2B^2I (b) $NABI^2$ (c) N^2ABI (d) $NABI$

18. The line on the earth surface joining the point where the field is horizontal, is called
(a) magnetic equator (b) magnetic line (c) magnetic axis (d) magnetic inertia

19. At a certain place, horizontal component is $\sqrt{3}$ times the vertical component. The angle of dip at this place is
(a) 0 (b) $\pi/3$ (c) $\pi/6$ (d) $\pi/8$

20. In a coil of resistance 10 Ω, 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



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

21. Two solenoids of same cross-sectional area have their lengths and number of turns in ratio of 1 : 2 both. The ratio of self-inductance of two solenoids is
(a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 1 : 4

22. Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon

(a) the rates at which currents are changing in the two coils

(b) relative position and orientation of the two coils

(c) the materials of the wires of the coils

(d) the currents in the two coils

23. If instantaneous current is given by $i = 4\cos(\omega t + \phi)$ ampere, then the r.m.s value of current is,

(a) 4 amperes (b) $4\sqrt{2}$ amperes (c) $2\sqrt{2}$ amperes (d) zero amperes

24. With increase in frequency of an A.C. supply, the impedance of an L-C-R series circuit

(a) remains constant (b) increases (c) decreases

(d) decreases at first, becomes minimum and then increases.

25. The transformer voltage induced in the secondary coil of a transformer is mainly due to

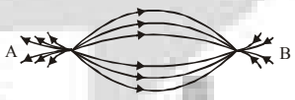
(a) a varying electric field (b) a varying magnetic field

(c) the vibrations of the primary coil (d) the iron core of the transformer

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.*

26. The spatial distribution of electric field due to charges (A, B) is shown in figure. Which one of the following statements is correct ?



(a) A is +ve and B –ve, |A| > |B| (b) A is –ve and B +ve, |A| = |B|

(c) Both are +ve but A > B (d) Both are –ve but A > B

27. Quantisation of charge implies

(a) charge cannot be destroyed (b) charge exists on particles

(c) there is a minimum permissible charge on a particle (d) charge, which is a fraction of a coulomb is not possible.

28. For a given surface the Gauss's law is stated as $\oint \vec{E}.d\vec{A} = 0$. From this we can conclude that

(a) E is necessarily zero on the surface (b) E is perpendicular to the surface at every point

(c) the total flux through the surface is zero (d) the flux is only going out of the surface

29. The capacitors of capacity C_1 and C_2 are connected in parallel, then the equivalent capacitance is

(a) $C_1 + C_2$ (b) $\frac{C_1C_2}{C_1 + C_2}$ (c) $\frac{C_1}{C_2}$ (d) $\frac{C_2}{C_1}$

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

(a) 9.60×10^{-17}J (b) -2.24×10^{-16} J (c) 2.24×10^{-16} J (d) -9.60×10^{-17} J

31. The voltage of an ac supply varies with time (t) as V = 120 sin 100 πt cos 100 πt. The maximum voltage and frequency respectively are

(a) 120 volt, 100 Hz (b) $\frac{120}{\sqrt{2}}$ volt, 100 Hz (c) 60 volt, 200 Hz (d) 60 volt, 100 Hz

32. In LCR circuit if resistance increases, quality factor

(a) increases finitely (b) decreases finitely (c) remains constant (d) None of these

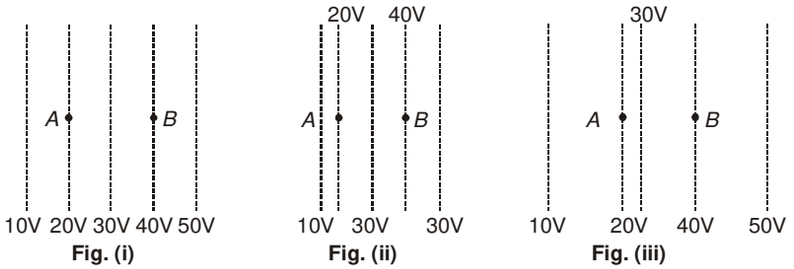
33. Figure shows some equipotential lines distributed in space. A charged object is moved from point A to point B.

(a) The work done in Fig. (i) is the greatest

(b) The work done in Fig. (ii) is least

(c) The work done is the same in Fig. (i), Fig.(ii) and Fig. (iii)

(d) The work done in Fig. (iii) is greater than Fig. (ii) but equal to that in



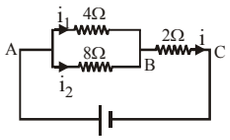
34. In the circuit shown in Fig, the current in 4 Ω resistance is 1.2 A. What is the potential difference between B and C?

(a) 3.6 volt

(b) 6.3 volt

(c) 1.8 volt

(d) 2.4 volt



35 The powers of two electric bulbs are 100 watt and 200 watt. Both of them are joined with 220 volt. The ratio of resistance of their filament will be

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

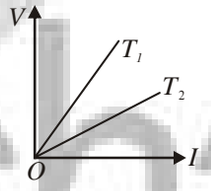
36. The voltage V and current I graphs for a conductor at two different temperatures T_1 and T_2 are shown in the figure. The relation between T_1 and T_2 is

(a) $T_1 > T_2$

(b) $T_1 < T_2$

(c) $T_1 = T_2$

(d) $T_1 = \frac{1}{T_2}$



37. Drift velocity of electrons is due to

(a) motion of conduction electrons due to random collisions.

(b) motion of conduction electrons due to electric field $\vec{E}$.

(c) repulsion to the conduction electrons due to inner electrons of ions.

(d) collision of conduction electrons with each other.

38. The current sensitivity of a galvanometer is defined as

(a) the current flowing through the galvanometer when a unit voltage is applied across its terminals.

(b) current per unit deflection.

(c) deflection per unit current.

(d) dflection per unit current when a unit voltage is applied across its terminals.

39. The magnetic dipole moment of a current loop is independent of

(a) magnetic field in which it is lying

(b) number of turns

(c) area of the loop

(d) current in the loop

40. An iron rod of length L and magnetic moment M is bent in the form of a semicircle. Now its magnetic moment will be

(a) M (b) 2M/π (c) M/π (d) M/π

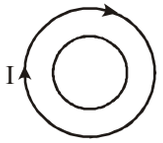
41. The magnetic flux (in weber) linked with a coil of resistance 10 Ω is varying with respect to time t as $\phi = 4t^2 + 2t + 1$. Then the current in the coil at time t = 1 second is

(a) 0.5 A (b) 2 A (c) 1.5 A (d) 1 A

42. An A.C. source is connected to a resistive circuit. Which of the following is true?

(a) Current leads ahead of voltage in phase
(b) Current lags behind voltage in phase
(c) Current and voltage are in same phase
(d) Any of the above may be true depending upon the value of resistance.

43. Two different wire loops are concentric and lie in the same plane. The current in the outer loop (I) is clockwise and increases with time. The induced current i in the inner loop_____.



(a) is clockwise
(b) is zero
(c) is counter clockwise
(d) has a direction that depends on the ratio of the loop radii.

44. A cylindrical bar magnet is kept along the axis a circular coil. If the magnet is rotated about its axis, then _____ in the coil.

(a) a current will be induced
(b) no current will be induced
(c) only an e.m.f. will induced
(d) an e.m.f and a current both will be induced

Given below are two statements labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options given below:

(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 and R is also false.

45. **Assertion:** Ampere's circuital law is analogous of Biot-Savart's law.

Reason: Ampere's circuital law cannot be derived from the Biot-savart's law.

46. **Assertion :** If two metal plates having charges Q, $-Q$ face each other at some separation are dipped into an oil tank, then electric field between the plates decreases.

Reason : Electric field between the plates, $E_{med} = \frac{E_{air}}{\kappa}$ due to polarization of dielectrical materials.

47. **Assertion :** The poles of magnet can not be separated by breaking into two pieces.

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

48. **Assertion:** The work done by magnetic force on a moving charged particle is zero.

Reason: The work done by magnetic force on a charged particle is zero as the force is always parallel to velocity of particle.

49. **Assertion :** If the current in a solenoid is reversed in direction while keeping the same magnitude, the magnetic field energy stored in the solenoid remains unchanged.

Reason : Magnetic field energy density is proportional to the magnetic field.

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.*

50. The electric field intensity just sufficient to balance the earth's gravitational attraction on an electron will be: (given mass and charge of an electron respectively are 9.1×10^{-31} kg and 1.6×10^{-19} C.)

(a) -5.6×10^{-11} N/C (b) -4.8×10^{-15} N / C (c) -1.6×10^{-19} N/C (d) -3.2×10^{-19} N / C

51. Select the correct statements from the following

I. Inside a charged or neutral conductor, electrostatic field is zero.
II. The electrostatic field at the surface of the charged conductor must be tangential to the surface at any point.
III. There is no net charge at any point inside the conductor.

(a) I and II (b) I and III (c) II and III (d) I, II and III

Case Study : *Read the following paragraph and answers the questions.*

Mean value of alternating current is defined as that value of steady current which would sent same amount of charge through a circuit in the time of half cycle ($\pi/2$) as is sent by the a.c. through the same circuit in the same time.

$$I_{mean} = \frac{2I_0}{\pi}, E_{mean} = \frac{2E_0}{\pi}$$

Here, I_0 *and* E_0 *are Peak current and voltage.*

R.M.S value of alternating current is the steady current which when passed through a given resistor for a certain time, shall produce the same heat as the given A.C. shall do when passed for the same time.

$$I_{rms} = \frac{I_0}{\sqrt{2}} = 0.707I_0, E_{rms} = \frac{E_0}{\sqrt{2}} = 0.707E_0$$

52. The alternating current of equivalent value of $\frac{I_0}{\sqrt{2}}$ is

(a) peak current (b) r.m.s. current (c) D.C. current (d) all of these

53. The r.m.s value of an a.c. of 50 Hz is 10 amp. The time taken by the alternating current in reaching from zero to maximum value and the peak value of current will be

(a) 2×10^{-2} sec and 14.14 amp (b) 1×10^{-2} sec and 7.07 amp

(c) 5×10^{-3} sec and 7.07 amp (d) 5×10^{-3} sec and 14.14 amp

54. The instantaneous voltage through a device of impedance 20 Ω is $e = 80 \sin 100 \pi t$. The effective value of the current is

(a) 3 A (b) 2.828 A (c) 1.732 A (d) 4 A

55. The voltage of an ac supply varies with time (t) as $V = 120 \sin 100 \pi t \cos 100 \pi t$. The maximum voltage and frequency respectively are

(a) 120 volt, 100 Hz (b) $\frac{120}{\sqrt{2}}$ volt, 100 Hz (c) 60 volt, 200 Hz (d) 60 volt, 100 Hz

OMR ANSWER SHEET

Sample Paper No – ☐

- ✶ Use Blue / Black Ball pen only.
- ✶ Please do not make any atray marks on the answer sheet.
- ✶ Rough work must not be done on the answer sheet.
- ✶ Darken one circle deeply for each question in the OMR Answer sheet, as faintly darkend / half darkened circle might by rejected.

Start time : _____ End time _____ Time taken _____

1. Name (in Block Letters)

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

2. Date of Exam

☐☐ ☐☐ ☐☐

3. Candidate's Signature ☐

SECTION-A

1.	(a)	(b)	(c)	(d)	9.	(a)	(b)	(c)	(d)	17.	(a)	(b)	(c)	(d)
2.	(a)	(b)	(c)	(d)	10.	(a)	(b)	(c)	(d)	18.	(a)	(b)	(c)	(d)
3.	(a)	(b)	(c)	(d)	11.	(a)	(b)	(c)	(d)	19.	(a)	(b)	(c)	(d)
4.	(a)	(b)	(c)	(d)	12.	(a)	(b)	(c)	(d)	20.	(a)	(b)	(c)	(d)
5.	(a)	(b)	(c)	(d)	13.	(a)	(b)	(c)	(d)					
6.	(a)	(b)	(c)	(d)	14.	(a)	(b)	(c)	(d)					
7.	(a)	(b)	(c)	(d)	15.	(a)	(b)	(c)	(d)					
8.	(a)	(b)	(c)	(d)	16.	(a)	(b)	(c)	(d)					

SECTION-B

21.	(a)	(b)	(c)	(d)	29.	(a)	(b)	(c)	(d)	37.	(a)	(b)	(c)	(d)
22.	(a)	(b)	(c)	(d)	30.	(a)	(b)	(c)	(d)	38.	(a)	(b)	(c)	(d)
23.	(a)	(b)	(c)	(d)	31.	(a)	(b)	(c)	(d)	39.	(a)	(b)	(c)	(d)
24.	(a)	(b)	(c)	(d)	32.	(a)	(b)	(c)	(d)	40.	(a)	(b)	(c)	(d)
25.	(a)	(b)	(c)	(d)	33.	(a)	(b)	(c)	(d)					
26.	(a)	(b)	(c)	(d)	34.	(a)	(b)	(c)	(d)					
27.	(a)	(b)	(c)	(d)	35.	(a)	(b)	(c)	(d)					
28.	(a)	(b)	(c)	(d)	36.	(a)	(b)	(c)	(d)					

SECTION-C

41.	(a)	(b)	(c)	(d)	45.	(a)	(b)	(c)	(d)	49.	(a)	(b)	(c)	(d)
42.	(a)	(b)	(c)	(d)	46.	(a)	(b)	(c)	(d)	50.	(a)	(b)	(c)	(d)
43.	(a)	(b)	(c)	(d)	47.	(a)	(b)	(c)	(d)					
44.	(a)	(b)	(c)	(d)	48.	(a)	(b)	(c)	(d)					

No. of Qns. Attempted		Correct		Incorrect		Marks	

Page for Rough Work

Sample Paper 1

ANSWER KEYS																			
1	(b)	**7**	(a)	**13**	(a)	**19**	(c)	**25**	(b)	**31**	(d)	**37**	(b)	**43**	(c)	**49**	(c)	**55**	(d)
2	(b)	**8**	(a)	**14**	(a)	**20**	(b)	**26**	(a)	**32**	(b)	**38**	(c)	**44**	(b)	**50**	(a)		
3	(a)	**9**	(d)	**15**	(d)	**21**	(b)	**27**	(d)	**33**	(c)	**39**	(a)	**45**	(d)	**51**	(b)		
4	(c)	**10**	(b)	**16**	(b)	**22**	(b)	**28**	(c)	**34**	(a)	**40**	(b)	**46**	(a)	**52**	(b)		
5	(d)	**11**	(b)	**17**	(d)	**23**	(c)	**29**	(a)	**35**	(d)	**41**	(d)	**47**	(b)	**53**	(d)		
6	(b)	**12**	(d)	**18**	(a)	**24**	(d)	**30**	(c)	**36**	(a)	**42**	(c)	**48**	(c)	**54**	(b)		

SOLUTIONS

1. **(b)** When we say that a body is charged, we always mean that the body is having excess of electrons (negatively charged) or is of deficient of electrons (positively charged).

2. **(b)**

3. **(a)** Due to insertion of a dielectric slab capacitance increase by K times. The potential difference, the electric field and the stored energy decreases by $\frac{1}{K}$ times.

4. **(c)** The potential energy is negative whenever there is attraction. Since a positive and negative charge attract each other therefore their energy is negative. When both the charges are separated by infinite distance, they do not attract each other and their energy is zero.

5. **(d)** Electric flux, $\phi = EA\cos\theta$, where θ = angle between E and normal to the surface.

Here $\theta = \frac{\pi}{2} \Rightarrow \phi = 0$

6. **(b)** We have $E_a = \frac{2kp}{r^3}$ and $E_e = \frac{kp}{r^3}$; $\therefore E_a = 2E_e$

7. **(a)** We know that $\frac{W_{AB}}{q} = V_B - V_A$

$\therefore V_B - V_A = \frac{2\,\text{J}}{20\,\text{C}} = 0.1\,\text{J/C} = 0.1\text{V}$

8. **(a)** [Hint $\Rightarrow R_t = R_o(1+\alpha t)$]

$5\Omega = R_0(1+\alpha\times 50)$ and $7\Omega = R_0(1+\alpha\times 100)$

or $\frac{5}{7} = \frac{1+50\alpha}{1+100\alpha}$ or $\alpha = \frac{2}{150} = 0.0133/°\text{C}$

9. **(d)** **10.** **(b)**

11. **(b)** Since, the voltage is same for the two combinations, therefore $H \propto \frac{1}{R}$. Hence, the combination of 39 bulbs will glow more.

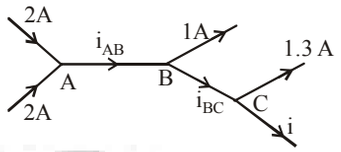
12. **(d)** Resistivity depends on various other factors like temp.

13. **(a)**

14. **(a)** According to Kirchhoff's first law

At junction A, $i_{AB} = 2+2 = 4\,\text{A}$

At junction B, $i_{AB} = i_{BC} + 1 \Rightarrow i_{BC} = 4-1 \Rightarrow 3\text{A}$



At junction C, $i = i_{BC} - 1.3 = 3 - 1.3 = 1.7\,\text{A}$

15. **(d)** Force, $F = qVB = \frac{mv^2}{R}$ $\therefore R = \frac{mv}{Bq}$

16. **(b)** We know that magnetic field at the centre of circular coil,

$B = \frac{\mu_0 In}{2r} = \frac{4\pi\times 10^{-7}\times 2\times 50}{2\times 0.5} = 1.25\times 10^{-4}T$

17. **(d)** $\tau = MB\sin\theta \Rightarrow \tau_{max} = NIAB$, $(\theta = 90°)$

18. **(a)**

19. **(c)** $\tan\delta = \frac{V}{H} = \frac{V}{\sqrt{3}V} = \frac{1}{\sqrt{3}}$

$\therefore \delta = 30° = \pi/6$ radian

20. **(b)** The charge through the coil = area of current-time $(i-t)$ graph

$q = \frac{1}{2}\times 0.1\times 4 = 0.2\,\text{C}$

$q = \frac{\Delta\phi}{R}$ [$\because$ Change in flux $(\Delta\phi) = q\times R$]

$q = 0.2 = \frac{\Delta\phi}{10}$

$\Delta\phi = 2$ weber

21. **(b)** Given $\frac{\ell_1}{\ell_2}=\frac{1}{2}$ and $\frac{N_1}{N_2}=\frac{1}{2}$ From

$$L=\frac{\mu_0 N^2 A}{\ell}\alpha\frac{N^2}{\ell}$$

we get, $\frac{L_1}{L_2}=\left(\frac{N_1}{N_2}\right)^2\Big/\left(\frac{\ell_1}{\ell_2}\right)=\frac{(1/2)^2}{1/2}=\frac{1}{2}$

22. **(b)** Mutual inductance depends on the relative position and orientation of the two coils.

23. **(c)** $i_{rms}=\frac{i_0}{\sqrt{2}}=\frac{4}{\sqrt{2}}=2\sqrt{2}$ ampere

24. **(d)** **25. (b)**

26. **(a)** Since lines of force starts from A and ends at B, so A is +ve and B is –ve. Lines of forces are more crowded near A, so A > B.

27. **(d)**

28. **(c)** $\oint\vec{E}.d\vec{A}=0$, represents charge inside close surface is zero. Electric field as any point on the surface may be zero.

29. **(a)** In parallel grouping of capacitors

$C_{eq}=C_1+C_2+\ldots\ldots\ldots C_n$

30. **(c)** $\frac{W_{PQ}}{q}=(V_Q-V_P)$

$\Rightarrow\quad W_{PQ}=q(V_Q-V_P)$

$=(-100\times1.6\times10^{-19})(-4-10)$

$=+2.24\times10^{-16}$J

31. **(d)** $V=120\sin100\pi t\cos100\pi t\Rightarrow V=60\sin200\pi t$

$V_{max}=60V$ and $v=100Hz$

32. **(b)**

33. **(c)** The work done (in displacing a charge particle) by a electric force is given by $W_{12}=q(V_2-V_1)$. Here initial and final potentials are same in all three cases are equal (20V) and same charge is moving from A to B, so work done is (ΔVq) same in all three cases.

34. **(a)** The potential difference across 4Ω resistance is given by $V=4\times i_1=4\times1.2=4.8$ volt

So, the potential across 8Ω resistance is also 4.8 volt.

Current $i_2=\frac{V}{8}=\frac{4.8}{8}=0.6$ amp

Current in 2Ω resistance $i=i_1+i_2$

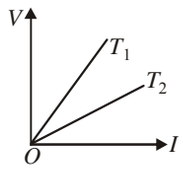
$\therefore i=1.2+0.6=1.8$ amp

Potential difference across 2Ω resistance

$V_{BC}=1.8\times2=3.6$ volts

35. **(d)** As $R\times\frac{1}{\text{Power}}$ $\quad\therefore\ R_1:R_2=2:1$

36. **(a)** The slope of *V–I* graph gives the resistance of a conductor at a given temperature.From the graph, it follows that resistance of a conductor at temperature T_1 is greater than at temperature T_2 As the resistance of a conductor is more at higher temperature and less at lower temperature, hence $T_1 > T_2$.



37. **(b)** Motion of conduction electrons due to random collisions has no preffered direction and average to zero. Drift velocity is caused due to motion of conduction electrons due to applied electric field $\vec{E}$.

38. **(c)** The current sensitivily of a galvanometer is defined as the deflection produced in the galvanometer per unit current flowing through it.

39. **(a)** Current loop acts as a magnetic dipole. Its magnetic moment is given by

$M = NIA$

where $N=$ number of turns, $I=$ current in a loop,

$A=$ area of the loop

From the above relation, we can conclude that magnetic dipole moment of a current loop is independent of magnetic field in which it is lying.

40. **(b)** On bending a rod it's pole strength remain unchanged where as its magnetic moment changes new magnetic moment $M'm(2R)=\left(\frac{2L}{\pi}\right)=\frac{2M}{\pi}$.

41. **(d)** Given : $\phi=4t^2+2t+1$ wb

$\therefore\quad\frac{d\phi}{dt}=\frac{d}{dt}(4t^2+2t+1)=8t+2=|\varepsilon|$

$I=\frac{|\varepsilon|}{R}=\frac{8t+2}{10\Omega}=\frac{8t+2}{10}A=1A$ At t = 1 s

42. **(c)** When resistance is connected to A.C source, then current & voltage are in same phase.

43. **(c)** As I increases, ϕ increases

$\therefore\ I_i$ is such that it opposes the increases in ϕ.

Hence, ϕ decreases (By Right Hand Rule). The induced current will be counter clockwise.

44. **(b)** Because there is no change in flux linked with coil.

45. **(d)** Ampere's circuital lawcan be derived from Biot-Savart law.

46. **(a)**

47. **(b)** When a magnet is cut into pieces, each piece becomes new magnet. $M'=\frac{m\ell}{2}=\frac{M}{2}$.

48. **(c)** Since the magnetic force is always perpendicular to the velocity of the charged particle so, work done is always zero.

49. **(c)**

50. **(a)** $-eE = mg$

$$\vec{E} = -\frac{9.1\times10^{-31}\times10}{1.6\times10^{-19}} = -5.6\times10^{-11}\,N/C$$

51. **(b)** (i) Electrostatic field is zero in side a charged conductor or neutral conductor.

(ii) Electrostatic fie ld at th e surface of a ch arged conductor must be normal to the surface at every point.

(iii) There is no net charge at any point inside the conductor and any excess charge must reside at the surface.

52. **(b)** $\frac{I_0}{\sqrt{2}}$ = RMS current

53. **(d)**

54. **(b)** Given equation, $e = 80 \sin 100\pi t$ …(i)

Standard equation of instantaneous voltage is given by $e = e_m \sin\omega t$ …(ii)

Compare (i) and (ii), we get $e_m = 80$ V

where e_m is the voltage amplitude.

Current amplitude $I_m = \frac{e_m}{Z}$ where Z = impendence

$= 80/20 = 4$ A.

$$I_{r.m.s} = \frac{4}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2} = 2.828\,A.$$

55. **(d)** $V = 120\sin100\pi t \cos100\pi t \Rightarrow V = 60\sin200\pi t$

$V_{max} = 60V$ and $v = 100$Hz