SOLVED PAPER	NEET (UG) (Re-Examination) 4th September 2022	Code U6

Important Instructions:

1. *The test is of **3 hours 20 minutes** duration and Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** in each subject are divided into two **Section (A and B)** as per details given below:*
   - ***(a) Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos- 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.*
   - ***(b) Section B** shall consist of **15 (Fifteen)** Questions in each subject (Question Nos- 36 to 50, 86 to 100, 136 to 150 and 80 to 200). In Section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.*

   Candidates are advised to read all 15 questions in each subject of Section B** before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.
2. *Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, one mark will be deducted from the total scores. **The maximum marks are 720.***
3. *Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses on Answer Sheet.*
4. *Use of Electronic/Manual Calculator is prohibited.*
5. ***No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.***
6. *The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.*
7. *Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of scribe or not.*

PHYSICS

Section-A

Q. 1. Identify the function which represents a non-periodic motion.

(1) $e^{-\omega t}$ **(2)** $\sin \omega t$

(3) $\sin \omega t + \cos \omega t$ **(4)** $\sin (\omega t + \pi/4)$

Q. 2. The magnetic field of a plane electromagnetic wave is given by $\vec{B} = 3 \times 10^{-8} \cos (1.6 \times 10^3 x + 48 \times 10^{10} t)\, \hat{j}$, then the associated electric field will be:

(1) $3 \times 10^{-8} \cos (1.6 \times 10^3 x + 48 \times 10^{10} t)\, \hat{i} \text{V/m}$

(2) $3 \times 10^{-8} \sin (1.6 \times 10^3 x + 48 \times 10^{10} t)\, \hat{i} \text{V/m}$

(3) $9 \sin (1.6 \times 10^3 x - 48 \times 10^{10} t)\, \hat{k} \text{V/m}$

(4) $9 \cos (1.6 \times 10^3 x + 48 \times 10^{10} t)\, \hat{k} \text{V/m}$

Q. 3. The incorrect statement about the property of a Zener diode is:

(1) Zener voltage remains constant at breakdown

(2) It is designed to operate under reverse bias

(3) Depletion region formed is very wide

(4) p and n regions of zener diode are heavily doped

Q. 4. A cell of emf 4 V and internal resistance 0.5 Ω is connected to a 7.5 Ω external resistance. The terminal potential difference of the cell is:

(1) 3.75 V **(2)** 4.25 V

(3) 4 V **(4)** 0.375 V

Q. 5. Given below are two statements:

Statement-I:

In an a.c. circuit, the current through a capacitor leads the voltage across it.

Statement-II:

In a.c. circuits containing pure capacitance only,

the phase difference between the current and the voltage is π:

In the light of the above statements, choose the most appropriate answer from the options given below:

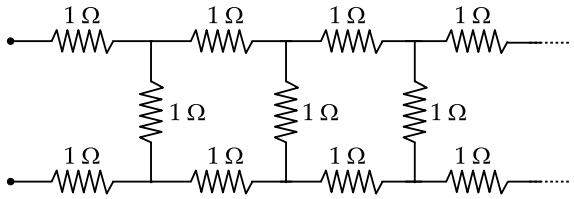
(1) Both **statement-I** and **statement-II** are correct

(2) Both **statement-I** and **statement-II** are incorrect

(3) **Statement-I** is correct but **statement-II** is incorrect

(4) **Statement-I** is incorrect but **statement-II** is correct

Q. 6. The equivalent resistance of the infinite network given below is:



(1) 2 Ω **(2)** $(1+\sqrt{2})\,\Omega$

(3) $(1+\sqrt{3})\,\Omega$ **(4)** $(1+\sqrt{5})\,\Omega$

Q. 7. A cricket ball is thrown by a player at a speed of 20 m/s in a direction 30° above the horizontal. The maximum height attained by the ball during its motion is (g = 10 m/s^2):

(1) 5 m **(2)** 10 m

(3) 20 m **(4)** 25 m

Q. 8. A closely packed coil having 1000 turns has an average radius of 62.8 cm. If current carried by the wire of the coil is 1 A, the value of magnetic field produced at the centre of the coil will be (permeability of free space = $4\pi \times 10^7$ H/m) nearly:

(1) 10^{-1} T **(2)** 10^{-2} T

(3) 10^{2} T **(4)** 10^{-3} T

Q. 9. An inductor of inductance 2 mH is connected to a 220 V, 50 Hz a.c. source. Let inductive reactance in the circuit is X_1. If a 220 V d.c. source replaces the a.c. source in the circuit, then the inductive reactance in the circuit is X_2. X_1 and X_2 respectively are:

(1) 6.28 Ω, zero **(2)** 6.28 Ω, infinity

(3) 0.628 Ω, zero **(4)** 0.628 Ω, infinity

Q. 10. During a cloudy day, a primary and a secondary rainbow may be created, then the:

(1) primary rainbow is due to double internal reflection and is formed above the secondary one.

(2) primary rainbow is due to double internal reflection and is formed below the secondary one.

(3) secondary rainbow is due to double internal reflection and is formed above the primary one.

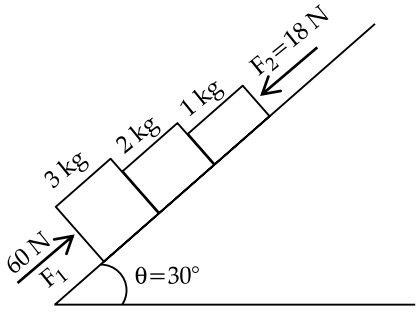
(4) secondary rainbow is due to single internal reflection and is formed above the primary one.

Q. 11. The light rays having photons of energy 4.2 eV are falling on a metal surface having a work function of 2.2 eV. The stopping potential of the surface is:

(1) 2 eV **(2)** 2 V

(3) 1.1 V **(4)** 6.4 V

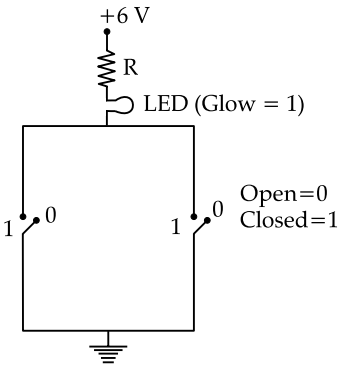
Q. 12. In the diagram shown, the normal reaction force between 2 kg and 1 kg is (Given g = 10 ms^{-2}) (Consider the surface, to be smooth):



(1) 25 N **(2)** 39 N

(3) 6 N **(4)** 10 N

Q. 13.



Identify the equivalent logic gate represented by the given circuit:

(1) OR **(2)** NOR

(3) AND **(4)** NAND

Q. 14. Two copper vessels A and B have the same base area but of different shapes. A takes twice the volume of water as that B requires to fill upto a particular common height. Then the correct statement among the following is:

(1) Pressure on the base area of vessels A and B is same.

(2) Pressure on the base area of vessels A and B is not same.

(3) Both vessels A and B weigh the same.

(4) Vessel B weighs twice that of A.

Q. 15. The distance between the two plates of a parallel plate capacitor is doubled and the area of each plate is halved. If C is its initial capacitance, its final capacitance is equal to:

(1) 2C **(2)** C/2

(3) 4C **(4)** C/4

Q. 16. The terminal velocity of a copper ball of radius 5 mm falling through a tank of oil at room temperature is 10 cm s^{-1}. If the viscosity of oil at room temperature is 0.9 kg m^{-1} s^{-1}, the viscous drag force is:

(1) 8.48×10^{-3} N **(2)** 8.48×10^{-5} N

(3) 4.23×10^{-3} N **(4)** 4.23×10^{-6} N

Q. 17. If $\vec{F} = 2\hat{i} + \hat{j} - \hat{k}$ and $\vec{r} = 3\hat{i} + 2\hat{j} - 2\hat{k}$, then the scalar and vector products of $\vec{F}$ and $\vec{r}$ have the magnitudes respectively as:

(1) 5, $\sqrt{3}$ **(2)** 4, $\sqrt{5}$

(3) 10, $\sqrt{2}$ **(4)** 10, 2

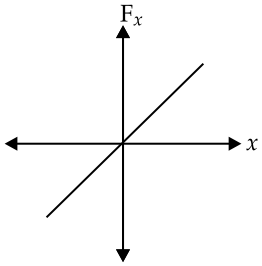
Q. 18. After passing through a polariser a linearly polarised light of intensity I is incident on an analyser making an angle of 30° with that of the polariser. The intensity of light emitted from the analyser will be :

(1) $\frac{I}{2}$ **(2)** $\frac{I}{3}$

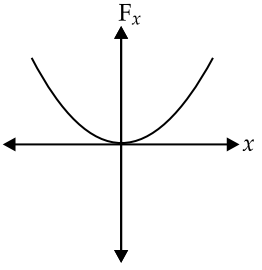
(3) $\frac{3I}{4}$ **(4)** $\frac{2I}{4}$

Q. 19. The restoring force of a spring with a block attached to the free end of the spring is represented by :

(1)



(2)



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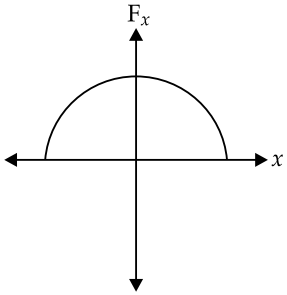

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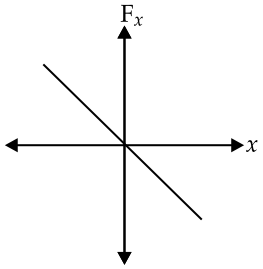


Q. 20. If the screen is moved away from the plane of the slits in a Young's double slit experiment, then the:

(1) angular separation of the fringes increases

(2) angular separation of the fringes decreases

(3) linear separation of the fringes increases

(4) linear separation of the fringes decreases

Q. 21. The effective capacitances of two capacitors are 3 μF and 16 μF, when they are connected in series and parallel respectively. The capacitance of two capacitors are:

(1) 10 μF, 6 μF **(2)** 8 μF, 8 μF

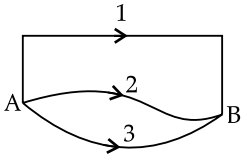
(3) 12 μF, 4 μF **(4)** 1.2 μF, 1.8 μF

Q. 22. The distance covered by a body of mass 5 g having linear momentum 0.3 kg m/s in 5 s is:

(1) 300 m **(2)** 30 m

(3) 3 m **(4)** 0.3 m

Q. 23. A gravitational field is present in a region and a mass is shifted from A to B through different paths as shown. If W_1, W_2 and W_3 represent the work done by the gravitational force along the respective paths, then



(1) $W_1 = W_2 = W_3$

(2) $W_1 > W_2 > W_3$

(3) $W_1 > W_3 > W_2$

(4) $W_1 < W_2 < W_3$

Q. 24. The reciprocal of resistance is:

(1) reactance **(2)** mobility

(3) conductivity **(4)** conductance

Q. 25. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R),

Assertion (A):

When a fire cracker (rocket) explodes in mid air, its fragments fly in such a way that they continue moving in the same path, which the fire cracker would have followed, had it not exploded

Reason (R):

Explosion of cracker (rocket) occurs due to internal forces only and no external force acts for this explosion.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(3) (A) is correct but (R) is not correct

(4) (A) is not correct but (R) is correct

Q. 26. The threshold frequency of a photoelectric metal is ν_0. If light of frequency $4\nu_0$ is incident on this metal, then the maximum kinetic energy of emitted electrons will be:

(1) $h\nu_0$ **(2)** $2h\nu_0$

(3) $3h\nu_0$ **(4)** $4h\nu_0$

Q. 27. The ratio of the magnitude of the magnetic field and electric field intensity of a plane electromagnetic wave in free space of permeability μ_0 and permittivity ε_0 is (Given that c - velocity of light in free space):

(1) c **(2)** $\frac{1}{c}$

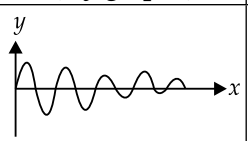
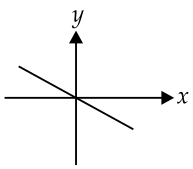
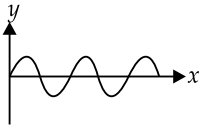
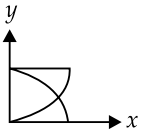
(3) $\frac{c}{\sqrt{\mu_0\varepsilon_0}}$ **(4)** $\frac{\sqrt{\mu_0\varepsilon_0}}{c}$

Q. 28. The shape of the magnetic field lines due to an infinite long, straight current carrying conductor is:

(1) a straight line **(2)** circular

(3) elliptical **(4)** a plane

Q. 29. Match List - I with List - II:

	List - I (x-y graphs)		List - II (Situations)
(a)		**(i)**	Total mechanical energy is conserved
(b)		**(ii)**	Bob of a pendulum is oscillating under negligible air friction
(c)		**(iii)**	Restoring force of a spring
(d)		**(iv)**	Bob of a pendulum is oscillating along with air friction

Choose the **correct** answer from the options given below:

(1) (a) - (iv), (b) - (i), (c) - (iii), (d) - (i)

(2) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

(3) (a) - (i), (b) - (iv), (c) - (iii), (d) - (i)

(4) (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv)

Q. 30. Given below are two statements:

Statement I:

The law of radioactive decay states that the number of nuclei undergoing the decay per unit time is inversely proportional to the total number of nuclei in the sample.

Statement II:

The half life of a radionuclide is the sum of the life time of all nuclei, divided by the initial concentration of the nuclei at time $t = 0$.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **Statement I** and **Statement II** are correct

(2) Both **Statement I** and **Statement II** are incorrect

(3) **Statement I** is correct but **Statement** II is incorrect

(4) **Statement I** is incorrect but **Statement II** is correct

Q. 31. An ideal gas follows a process described by the equation $PV^2 = C$ from the initial (P_1, V_1, T_1) to final (P_2, V_2, T_2) thermodynamic states, where C is a constant. Then:

(1) If $P_1 > {}_2$ then $T_1 < T_2$

(2) If $V_2 > V_1$ then $T_2 > T_1$

(3) If $V_2 > V_1$ then $T_2 < T_1$

(4) If $P_1 > P_2$ then $V_1 > V_2$

Q. 32. A standard filament lamp consumes 100 W when connected to 200 V a.c. mains supply. The peak current through the bulb will be :

(1) 0.707 A **(2)** 1 A

(3) 1.414 A **(4)** 2 A

Q. 33. Let R_1 be the radius of the second stationary orbit and R_2 be the radius of the fourth stationary orbit of an electron in Bohr's model. The ratio $\frac{R_1}{R_2}$ is:

(1) 0.25 **(2)** 0.5

(3) 2 **(4)** 4

Q. 34. The physical quantity that has the same dimensional formula as pressure is:

(1) Force

(2) Momentum

(3) Young's modulus of elasticity

(4) Coefficient of viscosity

Q. 35. An energy of 484 J is spent in increasing the speed of a flywheel from 60 rpm to 360 rpm. The moment of inertia of the flywheel is:

(1) 0.7 kg-m^2 **(2)** 3.22 kg-m^2

(3) 30.8 kg-m^2 **(4)** 0.07 kg-m^2

Section-B

Q. 36. The magnetic flux linked to a circular coil of radius R is:

$\phi = 2t^3 + 4t^2 + 2t + 5$ Wb

The magnitude of induced emf in the coil at $t = 5$ s is:

(1) 108 V **(2)** 197 V

(3) 150 V **(4)** 192 V

Q. 37. An astronomical refracting telescope is being used by an observer to observe planets in normal adjustment. The focal lengths of the objective and eye piece used in the construction of the telescope are 20 m and 2 cm respectively. Consider the following statements about the telescope:

(a) The distance between the objective and eye piece is 20.02 m

(b) The magnification of the telescope is (–) 1000

(c) The image of the planet is erect and diminished

(d) The aperture of eye piece is smaller than that of objectie

The correct statements are:

(1) (a), (b) and (c) **(2)** (b), (c) and (d)

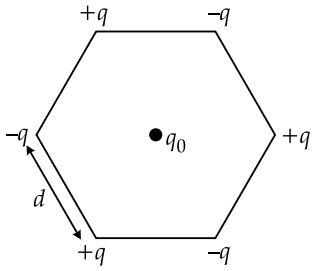
(3) (c), (d) and (a) **(4)** (a), (b) and (d)

Q. 38. At any instant, two elements X_1 and X_2 have same number of radioactive atoms. If the decay constant of X_1 and X_2 are 10λ and λ respectively. Then the time when the ratio of their atoms becomes $\frac{1}{e}$ respectively will be:

(1) $\frac{1}{11\lambda}$ **(2)** $\frac{1}{6\lambda}$

(3) $\frac{1}{6\lambda}$ **(4)** $\frac{1}{5\lambda}$

Q. 39. Six charges $+q$, $-q$, $+q$, $-q$, $+q$ and $-q$ are fixed at the corners of a hexagon of side d as shown in the figure. The work done in bringing a charge q_0 to the centre of the hexagon from infinity is (ε_0 - permittivity of free space):



(1) Zero **(2)** $\frac{-q^2}{4\pi\varepsilon_0 d}$

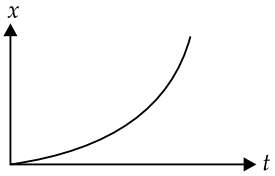
(3) $\frac{-q^2}{4\pi\varepsilon_0 d}\left(3-\frac{1}{\sqrt{2}}\right)$ **(4)** $\frac{-q^2}{4\pi\varepsilon_0 d}\left(6-\frac{1}{\sqrt{2}}\right)$

Q. 40. An organ pipe filled with a gas at 27°C resonates at 400 Hz in its fundamental mode. If it is filled with the same gas at 90°C, the resonance frequency at the same mode will be:

(1) 420 Hz **(2)** 440 Hz

(3) 484 Hz **(4)** 512 Hz

Q. 41. The position-time ($x - t$) graph for positive acceleration is:

(1)


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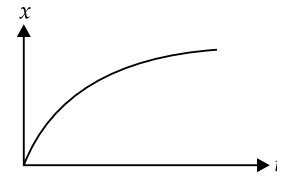

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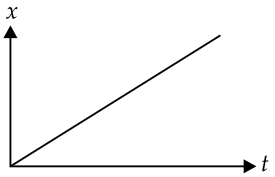

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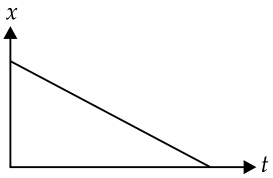


Q. 42. The collector current in a common base amplifier using *n-p-n* transistor is 24 mA. If 80% of the electrons released by the emitter is accepted by the collector, then the base current is numerically:

(1) 6 mA and leaving the base

(2) 3 mA and leaving the base

(3) 6 mA and entering the base

(4) 3 mA and entering the base

Q. 43. Three vessels of equal capacity have gases at the same temperature and pressure. The first vessel contains helium (monoatomic), the second contains fluorine (diatomic) and the third contains sulfur hexafluoride (polyatomic). The correct statement, among the following is:

(1) All vessels contain unequal number of respective molecules

(2) The root mean square speed of molecules is same in all three cases

(3) The root mean square speed of helium is the largest

(4) The root mean square speed of sulfur hexafluoride is the largest

Q. 44. In a gravitational field, the gravitational potential is given by, $V = \frac{K}{x}$ (J/kg). The gravitational field intensity at point (2, 0, 3) m is:

(1) $+\frac{K}{2}$ **(2)** $-\frac{K}{2}$

(3) $-\frac{K}{4}$ **(4)** $+\frac{K}{4}$

Q. 45. Two very long, straight, parallel conductors A and B carry current of 5 A and 10 A respectively and are at a distance of 10 cm from each other. The direction of current in two conductors is same. The force acting per unit length between two conductors is ($\mu_0 = 4\pi \times 10^{-7}$ SI unit):

(1) 2×10^{-4} Nm^{-1} and is attractive

(2) 2×10^{-4} Nm^{-1} and is repulsive

(3) 1×10^{-4} Nm^{-1} and is attractive

(4) 1×10^{-4} Nm^{-1} and is repulsive

Q. 46. The magnetic field on the axis of a circular loop of radius 100 cm carrying current I = $\sqrt{2}$ A, at point 1 m away from the centre of the loop is given by:

(1) 3.14×10^{-7} T **(2)** 6.28×10^{-7} T

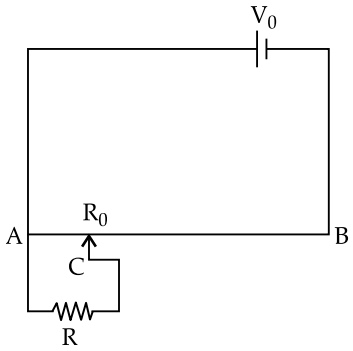
(3) 3.14×10^{-4} T **(4)** 6.28×10^{-4} T

Q. 47. Two rods one made of copper and other made of steel of the same length and same cross sectional area are joined together. The thermal conductivity of copper and steel are 385 J s^{-1} K^{-1} m^{-1} and 50 J s^{-1} m^{-1} respectively. The free ends of copper and steel are held at 100°C and 0°C respectively. The temperature at the junction is, nearly:

(1) 12°C **(2)** 50°C

(3) 73°C **(4)** 88.5°C

Q. 48. The sliding contact C is at one fourth of the length of the potential wire (AB) from A as shown in the circuit diagram. If the resistance of the wire AB is R_0, then the potential drop (V) across the resistor R is:



(1) $\frac{4V_0R}{3R_0 + 16R}$ **(2)** $\frac{4V_0R}{3R_0 + R}$

(3) $\frac{2V_0R}{4R_0 + R}$ **(4)** $\frac{2V_0R}{2R_0 + 3R}$

Q. 49. The ratio of coulomb's electrostatic force to the gravitational force between an electron and a proton separated by some distance is 2.4×10^{39}. The ratio of the proportionality constant, K = $\frac{1}{4\pi\varepsilon_0}$ to the Gravitational constant G is nearly

(Given that the charge of the proton and electron each = 1.6×10^{-19} C, the mass of the electron = 9.11×10^{-31} kg, the mass of the proton = 1.67×10^{-27} kg):

(1) 10^{20} **(2)** 10^{30}

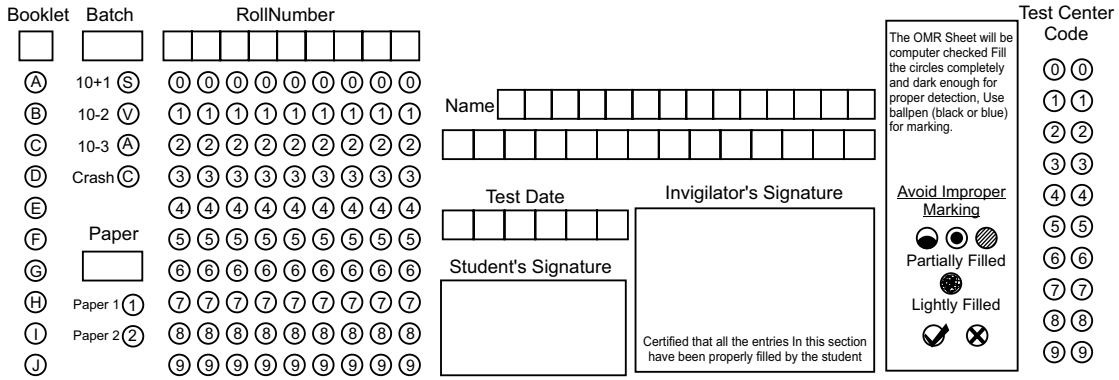
(3) 10^{40} **(4)** 10

Q. 50. The percentage error in the measurement of g is (Given that $g = \frac{4\neq^2L}{T^2}$, L = (10 ± 0.1) cm, T = (100 ± 1) s):

(1) 2% **(2)** 5%

(3) 3% **(4)** 7%

❑❑



1 ① ② ③ ④	6 ① ② ③ ④	11 ① ② ③ ④	16 ① ② ③ ④
2 ① ② ③ ④	7 ① ② ③ ④	12 ① ② ③ ④	17 ① ② ③ ④
3 ① ② ③ ④	8 ① ② ③ ④	13 ① ② ③ ④	18 ① ② ③ ④
4 ① ② ③ ④	9 ① ② ③ ④	14 ① ② ③ ④	19 ① ② ③ ④
5 ① ② ③ ④	10 ① ② ③ ④	15 ① ② ③ ④	20 ① ② ③ ④
21 ① ② ③ ④	26 ① ② ③ ④	31 ① ② ③ ④	36 ① ② ③ ④
22 ① ② ③ ④	27 ① ② ③ ④	32 ① ② ③ ④	37 ① ② ③ ④
23 ① ② ③ ④	28 ① ② ③ ④	33 ① ② ③ ④	38 ① ② ③ ④
24 ① ② ③ ④	29 ① ② ③ ④	34 ① ② ③ ④	39 ① ② ③ ④
25 ① ② ③ ④	30 ① ② ③ ④	35 ① ② ③ ④	40 ① ② ③ ④
41 ① ② ③ ④	46 ① ② ③ ④		
42 ① ② ③ ④	47 ① ② ③ ④		
43 ① ② ③ ④	48 ① ② ③ ④		
44 ① ② ③ ④	49 ① ② ③ ④		
45 ① ② ③ ④	50 ① ② ③ ④		

Q. No.	Answer Key	Topic's Name	Chapter's Name
SECTION-A (PHYSICS)			
1	1	Electronic Devices	Electronic Devices
2	4	Electromagnetic Waves	Electromagnetic Waves
3	3	Electronic Devices	Electronic Devices
4	1	Current Electricity	Current Electricity
5	3	Alternating Currents	Electromagnetic Induction and Alternating Current
6	3	Current Electricity	Current Electricity
7	1	Motion in a Straight Line	Kinematics
8	4	Magnetic Effects of Current	Magnetic Effects of Current and Magnetism
9	3	Alternating Currents	Electromagnetic Induction and Alternating Current
10	3	Ray Optics and Optical Instruments	Optics
11	2	Dual Nature of Matter and Radiation	Dual Nature of Matter and Radiation
12	1	Laws of Motion	Laws of Motion
13	1	Electronic Devices	Electronic Devices
14	1	Mechanical Properties of Fluids	Properties of Bulk Matter
15	4	Electrostatic Potential and Capacitance	Electrostatics
16	1	Mechanical Properties of Fluids	Properties of Bulk Matter
17	3	Concept of Vector and Motion in a Plane	Kinematics
18	3	Ray Optics and Optical Instruments	Optics
19	4	Oscillations	Oscillations and Waves
20	3	Wave Optics	Optics
21	3	Electrostatic Potential and Capacitance	Electrostatics
22	1	Motion in a Straight Line	Kinematics
23	1	Gravitation	Gravitation
24	4	Current Electricity	Current Electricity
25	4	Motion of System of Particles and Rigid Body	Motion of System of Particles and Rigid Body
26	3	Dual Nature of Matter and Radiation	Dual Nature of Matter and Radiation
27	2	Electromagnetic Waves	Electromagnetic Waves
28	2	Magnetic Effects of Current	Magnetic Effects of Current and Magnetism
29	2	Motion in a Straight Line	Kinematics
30	2	Nuclei	Atoms and Nuclei
31	3	Behaviour of Perfect Gas and Kinetic theory	Behaviour of Perfect Gas and Kinetic theory
32	1	Alternating Currents	Electromagnetic Induction and Alternating Currents
33	1	Atoms	Atoms and Nuclei
34	3	Units and Measurements	Physical World and Measurement
35	1	Motion of System of Particles and Rigid Body	Motion of System of Particles and Rigid Body
SECTION-B (PHYSICS)			
36	4	Electromagnetic Induction	Electromagnetic Induction and Alternating Currents
37	4	Ray Optics and Optical Instruments	Optics
38	2	Nuclei	Atoms and Nuclei
39	1	Electrostatic Potential and Capacitance	Electrostatics
40	2	Waves	Oscillations and Waves

Q. No.	Answer Key	Topic's Name	Chapter's Name
41	1	Motion in a Straight Line	Kinematics
42	3	Electronic Devices	Electronic Devices
43	3	Behaviour of Perfect Gas and Kinetic theory	Behaviour of Perfect Gas and Kinetic theory
44	3	Gravitation	Gravitation
45	3	Magnetic Effects of Current	Magnetic Effects of Current and Magnetism
46	1	Magnetic Effects of Current	Magnetic Effects of Current and Magnetism
47	4	Thermal Properties of Matter	Bulk Properties of Matter
48	1	Current Electricity	Current Electricity
49	1	Electrostatics and Gravitation	Electrostatics and Gravitation
50	3	Units and Measurements	Physical World and Measurement

NEET (UG)
(Re-Examination)
4th September 2022 Paper

ANSWERS WITH EXPLANATION

PHYSICS

Section-A

1. Option (1) is correct.
Explanation: Only option (1) is representing non-periodic motion as it is an exponential function.

2. Option (4) is correct.
Explanation: Given, $B = 3 \times 10^{-8} \cos (1.6 \times 10^3 x + 48 \times 10^{10} t)$ …(1)

$B = B_0 \cos (kx + \omega t)$ …(2)

On comparing equations (1) & (2), we get;

$B_0 = 3 \times 10^{-8}$

$c = \frac{\omega}{k} = \frac{48 \times 10^{10}}{1.6 \times 10^3}$

$= 3 \times 10^8$

And also, $c = \frac{E_0}{B_0}$

Hence, $E_0 = B_0 \times c$

$= 3 \times 10^{-8} \times 3 \times 10^8$

$= 9$

So, the required equation is:

$E = 9 \cos(1.6 \times 10^3 x + 48 \times 10^{10} t)$

3. Option (3) is correct.
Explanation: Zener diode is highly doped *p-n* junction, and zener voltage is constant. Its depletion region is very thin.

4. Option (1) is correct.

Explanation: As, $i = \frac{E}{R + r}$

Hence, $i = \frac{4}{7.5 + 0.5} = \frac{4}{8} = \frac{1}{2}$

And, $V = E - ir$

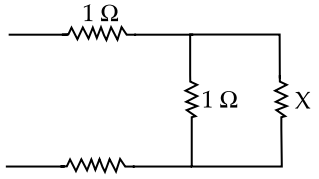
(where, the symbols have their usual meanings)

$\mathbf{V} = 4 - 0.5 \times 0.5$

$\mathbf{V} = 3.75$ volt

5. Option (3) is correct.
Explanation: In pure capacitive circuits, the current leads the voltage by $\frac{\pi}{2}$ or 90°.

6. Option (3) is correct.
Explanation: Let effective resistance be X.



Then, $X = 1 + \frac{X}{X+1} + 1$

$X = \frac{X + 1 + X + X + 1}{X + 1}$

$X(X + 1) = 3X + 2$

$X^2 - 2X - 2 = 0$

$X = \frac{2 \pm \sqrt{12}}{2}$

$X = 1 \pm \sqrt{3}\ \Omega$

$X = 1 + \sqrt{3}\ \Omega$

(as R can't be negative)

7. Option (1) is correct.

Explanation: As, $H = \frac{u^2 \sin^2 \theta}{2g}$

$= \frac{(20)^2 \sin^2 30°}{2(10)} = 5\text{m}$

8. Option (4) is correct.
Explanation: As, magnetic field at centre of coil,

$B = \frac{\mu_0 N i}{2R}$

$B = \frac{4\pi \times 10^{-7} \times 1000 \times 1}{2 \times 62.8 \times 10^{-2}}$

$= \frac{4 \times 3.14 \times 10^{-7} \times 10^3}{2 \times 62.8 \times 10^{-2}}$

$= 10^{-3}$ T

9. Option (3) is correct.
Explanation: For AC circuits,

$X_L = \omega L$

$X_L = 2\pi n L$ $(\because \omega = 2\pi n)$

$X_L = 0.628\ \Omega$

Hence, $X_1 = 0.628\ \Omega$

For DC circuits, $\omega = 0$

$X_L = \omega L$

$X_L = 0$

Hence $X_2 = 0$

10. Option (3) is correct.
Explanation: Secondary rainbow is formed due to double internal reflection and is formed above the primary rainbow. The secondary rainbow is brighter than the primary rainbow.

11. Option (2) is correct.
Explanation: By Einstein photoelectric equation, we have;

K.E. $= h\nu - \phi$

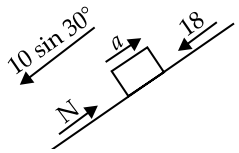
$eV_0 = 4.2\text{ eV} - 2.2\text{ eV}$

$eV_0 = 2\text{ eV} = 2$ volt

12. Option (1) is correct.
Explanation: Total force along inclined plane,

$$f = -F_1 + 6g\sin 30° + F_2$$
$$f = -60 + 6g\sin 30° + 18$$
$$f = -60 + 6 \times 10 \times \frac{1}{2} + 18$$
$$f = 12 \text{ N (downwards)}$$

acceleration, $a = \frac{f}{m} = \frac{12}{6} = 2 \text{ m/s}^2$



As per question, the normal force between 2 kg and 1 kg is,

$$N - 18 - 10\sin 30° = ma$$
$$N - 18 - 10 \times \frac{1}{2} = 1 \times 2$$
$$N = 2 + 23$$
$$N = 25 \text{ N}$$

13. Option (1) is correct.

Explanation: As per question, the current flows only when the switch is ON.

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

The truth table represents the OR Gate.

14. Option (1) is correct.

Explanation: Pressure, $P = h\rho g$ …(1)

In above equation, ρ represents density of water, g represents acceleration due to gravity and h is the height of the vessel.

As both vessels have same height and containing water, then densities are also same. Hence, the pressure on the base area of vessels A and B is same.

15. Option (4) is correct.

Explanation: The capacitance of parallel plate capacitor,

$$C = \frac{\varepsilon_0 A}{d} \quad \text{…(i)}$$

(where, the symbols have their usual meanings.)

Given, $d' = 2d$ & $A' = \frac{A}{2}$

Then, $$C' = \frac{\varepsilon_0\left(\frac{A}{2}\right)}{2d} = \frac{\varepsilon_0 A}{4d} = \frac{C}{4}$$

16. Option (1) is correct.

Explanation: By Stobal's law,

$keF = 6\pi\eta rv$

(where, the symbols have their usual meanings)

$$F = 6 \times 3.14 \times 0.9 \times 5 \times 10^{-3} \times 10 \times 10^{-2}$$
$$F = 84.78 \times 10^{-4}$$
$$= 8.478 \times 10^{-3} \text{ N} = 8.48 \times 10^{-3} \text{ N}$$

17. Option (3) is correct.

Explanation: $\vec{F} = 2\hat{i} + \hat{j} - \hat{k}$

$\vec{r} = 3\hat{i} + 2\hat{j} - 2\hat{k}$ (given)

The scalar product of $\vec{F}$ and $\vec{r}$ is

$$\vec{F}.\vec{r} = (2)(3) + (1)(2) + (-1)(-2)$$
$$= 6 + 2 + 2 = 10$$

The vector product of $\vec{F}$ and $\vec{r}$ is

$$\vec{F} \times \vec{r} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 1 & 1 \\ 3 & 2 & 2 \end{vmatrix}$$

$$= \hat{i}[(1 \times -2) - (2 \times -1)] - \hat{j}[(2 \times -2) - (-1 \times 3)] + \hat{k}[(2 \times 2) - (3 \times 1)]$$
$$= \hat{i}(0) - \hat{j}(-1) + \hat{k}(1) = \hat{j} + \hat{k}$$

Magnitude $= \sqrt{(1)^2 + (1)^2} = \sqrt{2}$

18. Option (3) is correct.

Explanation: As per Malus law, $I = I_0\cos^2\phi$, where symbols have their usual meanings.

$$I' = I\cos^2 30°$$
$$I' = I\left(\frac{\sqrt{3}}{2}\right)^2$$
$$I' = \frac{3I}{4}$$

19. Option (4) is correct.

Explanation: Restoring force of spring,

$$F \propto -x$$

(where, x is the displacement)

Only graph (4) is representing the above equation.

20. Option (3) is correct.

Explanation: As per YDSE, $x = \frac{\lambda D}{d}$,

(where, symbols have their usual meanings)

If the screen is moving away from the slits then D increases, and hence the fringe width (x) increases.

21. Option (3) is correct.

Explanation:

$$C_p = C_1 + C_2 \quad \text{...(1)}$$
$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} \quad \text{...(2)}$$

C_1 and C_2 are individual capacitance, C_s is the series capacitance & C_p is the parallel capacitance.

Hence, $16 = C_1 + C_2$ ...(3)

$$\frac{1}{3} = \frac{1}{C_1} + \frac{1}{C_2} \quad \text{...(4)}$$

By using equations (3) & (4), we have;

$$\frac{1}{3} = \frac{1}{C_1} + \frac{1}{(16 - C_1)}$$

$$\frac{1}{3} = \frac{16 - C_1 + C_1}{C_1 \times (16 - C_1)}$$

$$\Rightarrow \quad \frac{1}{3} = \frac{16}{16C_1 - C_1^2}$$

$$\Rightarrow \quad C_1^2 - 16C + 48 = 0$$

$$\Rightarrow \quad C_1 = \frac{16 \pm \sqrt{256 - 192}}{2}$$

[By Dharacharya rule, we have; $C = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$]

$$\Rightarrow \quad C_1 = \frac{16 \pm \sqrt{64}}{2}$$

$$\Rightarrow \quad C_1 = \frac{16 \pm \sqrt{8}}{2}$$

$$C_1 = 12 \text{ or } 4 \text{ (in } \mu F)$$

Hence, $C_2 = 4 \text{ or } 12 \text{ (in } \mu F)$

22. Option (1) is correct.

Explanation: Given,

$m = 5$ g $= 0.005$ kg,

$P = mv = 0.3$ kg m/s, and

$t = 5$ s,

(where, symbols have their usual meanings.)

$$P = mv = 0.3$$

Hence, $V = \frac{0.3}{m} = \frac{0.3}{0.005} = 60$ m/s

Hence, the distance covered = speed × time

$= 60 \times 5 = 300$ m

23. Option (1) is correct.

Explanation: Since, gravitational force is a conservative force and hence the work done is independent of the paths covered between points A and B.

24. Option (4) is correct.

Explanation: Conductance $\propto \frac{1}{\text{Resistance}}$

25. Option (4) is correct.

Explanation: As no external force acts along x-axis, hence centre of mass will move with same speed in x-direction before and after the explosion.

26. Option (3) is correct.

Explanation: By using Einstein's photoelectric equation, we have,

$$KE = h\nu - \phi$$

$$KE = h\nu - h\nu_0$$

$$= h(4\nu_0) - h\nu_0$$

$$= 3h\nu_0$$

where, h = Planck's constant,

ν & ν_0 = frequencies, and

ϕ = work function.

27. Option (2) is correct.

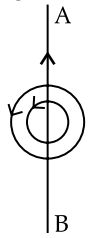
Explanation: As per question,

$$\frac{B_0}{E_0} = \frac{1}{c} = \sqrt{\mu_0 \varepsilon_0}$$

(where, the symbols have their usual meanings.)

28. Option (2) is correct.

Explanation: Straight current carrying wire produces circular magnetic field.



29. Option (2) is correct.

Explanation: **(a)** Amplitude decreases continuously (damped oscillation)

(b) $a \propto -x$

(c) Amplitude is constant

(d) Total (K.E + P.E.) = constant

30. Option (2) is correct.

Explanation: Both statements are incorrect.

As per law of disintegration, we have,

$$\frac{dN}{dt} = -\lambda N$$

(where, the symbols have their usual meanings)

Hence, dN α N, so the statement I is incorrect.

$T_{1/2}$ is the time in which active number of nuclei becomes half, so the statement II is also incorrect.

31. Option (3) is correct.

Explanation: As per question,

$$PV^2 = C \qquad ...(1)$$

And by ideal gas equation, we have;

$$PV = nRT \qquad ...(2)$$

Hence, $\left(\frac{nRT}{V}\right)V^2 = C$

Hence, $TV = \text{constant}$

& $T \propto \frac{1}{V} \therefore V_2 > V_1 \text{ and } T_1 > T_2$

32. Option (1) is correct.

Explanation: Power,

$$P = I_{rms} V_{rms}$$

$$I_{rms} = \frac{P}{V_{rms}} = \frac{100}{200} = \frac{1}{2}$$

$$I_0 = \sqrt{2}\, I_{rms}$$

$$I_0 = \sqrt{2} \times \frac{1}{2}$$

$$I_0 = \frac{1}{\sqrt{2}} = 0.707 \text{ A}$$

33. Option (1) is correct.

Explanation: As,

$$R_n = 0.529 \frac{n^2}{Z}$$

Hence, $\frac{R_1}{R_2} = \frac{0.529 \frac{n_1^2}{Z_1}}{0.529 \frac{n_2^2}{Z_2}}$

$$\frac{R_1}{R_2} = \frac{n_1^2}{n_2^2} = \frac{(2)^2}{(4)^2}$$

$$\therefore \quad \frac{R_1}{R_2} = \frac{1}{4} = 0.25$$

(where, the symbols have their usual meanings)

34. Option (3) is correct.

Explanation: Dimensions of Pressure = $[ML^{-1}T^{-2}]$

Dimension of Force = $[MLT^{-2}]$

Dimension of Momentum = $[MLT^{-1}]$

Dimension of Young's modulus of elasticity = $[ML^{-1}T^{-2}]$

Dimension of coefficient of viscosity = $[ML^{-1}T^{-1}]$

35. Option (1) is correct.

Explanation: Given,

$$\omega_1 = 60 \text{ rpm} = 60 \times \frac{2\pi}{60} = 2\pi \text{ rad/s}$$

$$\omega_2 = 360 \text{ rpm} = 360 \times \frac{2\pi}{60} = 12\pi \text{ rad/s}$$

Change in kinetic energy,

$$\Delta \text{K.E} = \frac{1}{2} I(\omega_2^2 - \omega_1^2)$$

$$484 = \frac{1}{2} \times I(\omega_2 + \omega_1)(\omega_2 - \omega_1)$$

$$\Rightarrow \quad I = \frac{484 \times 2}{14\pi \times 10\pi} = 0.7 \text{ kg.m}^2$$

(where, the symbols have their usual meanings)

Section-B

36. Option (4) is correct.

Explanation: Given :

$\phi = 2t^3 + 4t^2 + 2t + 5$, and

& $t = 5\ s$

By Faraday's law of EMI, we have,

$$\text{emf}, = -\frac{d\phi}{dt}$$

(where, the symbols have their usual meanings)

$$e = \left|\frac{d\phi}{dt}\right| = \left|\frac{d}{dt}(2t^3 + 4t^2 + 2t + 5)\right|$$

$$= 6t^2 + 8t + 2$$

At $t = 5\ s$,

$e = 6(5)^2 + 8(5) + 2$

$= 192$ V

37. Option (4) is correct.

Explanation: Given,

$f_e = 2$ cm, and

$f_o = 20$ m $= 2000$ cm

For normal adjustment,

$$\text{Magnification power} = \frac{-fo}{fe} = \frac{-2000}{2}$$

$= -1000$

Length of telescope $= fo + fe$

$= 2000 + 2$

$= 2002$ cm

$= 20.02$ m

The image formed is inverted and magnified, and the aperture of objective is larger than eye piece of the telescope.

(f_o & f_e are focal lengths of objective & eye piece respectively.)

38. Option (2) is correct.

Explanation: By radioactivity law, we have,

$$N = N_o e^{-\lambda t}$$

(where, the symbols have their usual meanings)

Hence, for two elements,

$$\frac{N_1}{N_2} = \frac{N_o e^{-10\lambda t}}{N_o e^{-\lambda t}} = \frac{1}{e}$$

Hence, $e^{-9\lambda t} = e$

$$t = \frac{1}{9\lambda}$$

39. Option (1) is correct.

Explanation:

Work done = Change in potential energy

$W = U_f - U_i$

Hence, $W = 0$

40. Option (2) is correct.

Explanation: As per question, we have;

frequency, $f = \frac{v}{4l}$

Hence, $$\frac{f_1}{f_2} = \frac{\frac{v_1}{4l}}{\frac{v_2}{4l}}$$

$$\Rightarrow \quad \frac{400}{f_2} = \frac{v_1}{v_2}$$

$$\Rightarrow \quad \frac{400}{f_2} = \sqrt{\frac{T_1}{T_2}} \qquad [\because V \propto \sqrt{T}\ ]$$

$$\Rightarrow \quad \frac{400}{f_2} = \sqrt{\frac{300}{363}}$$

$$\Rightarrow \quad f_2 = \sqrt{\frac{363}{300}} \times 400$$

$$\Rightarrow \quad f_2 = 440 \text{ Hz}$$

41. Option (1) is correct.

Explanation: As $x = \frac{1}{2} at^2$, hence the graph between x and t is upward parabola.

42. Option (3) is correct.

Explanation: As per question, we have,

$I_c = 24$ mA, and $\alpha = 0.8$

Now, $$I_E = \frac{I_c}{\alpha} = \frac{24}{0.8} = 30 \text{ mA}$$

As, $I_E = I_B + I_C$

Hence, $I_B = I_E - I_C$

$= 6$ mA

(where, the symbols have their usual meanings)

43. Option (3) is correct.

Explanation: As, $V_{rms} = \sqrt{\frac{3KT}{m}}$

Hence, $v_{rms} \propto \frac{1}{m}$

So, lower the mass, higher/greater the velocity.
(where, the symbols have their usual meanings)

44. Option (3) is correct.

Explanation: Given,

$$V = \frac{-K}{x}(J/kg)$$

As, $$E_x = \frac{-dv}{dx}$$

$$= K\frac{d(x-1)}{dx}$$

$$= \frac{-K}{x^2} = \frac{-K}{(2)^2} \quad (\text{at } x = 2)$$

$$= \frac{-K}{4}$$

45. Option (3) is correct.

Explanation: As per question,

$$\frac{F}{l} = \frac{\mu_o}{4\pi} \times \frac{2I_1I_2}{r}$$

$$= \frac{4\pi \times 10^{-7} \times 2 \times 5 \times 10}{2\pi \times 0.1}$$

$$= 10^{-4}\ Nm^{-1}$$

The nature of the force is attractive.
(where, the symbols have their usual meanings)

46. Option (1) is correct.

Explanation: As per question, we have;

$$\mathbf{B} = B_0 \sin^3\theta$$

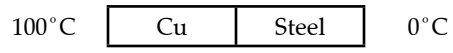
$$= \frac{\mu_0 I}{2\pi}\sin^3(45^o)$$

$$= \frac{4\pi \times 10^{-7} \times \sqrt{2}}{2 \times 1}\left(\frac{1}{\sqrt{2}}\right)^3$$

$$= 3.14 \times 10^{-7}\ T$$

47. Option (4) is correct.

Explanation: As per question, we have;



θ = ?

As $$K = \frac{Qd}{A\Delta t},$$

where, K = thermal conductivity
Q = amount of heat transferred
d = distance between two planes
A = area of surface, and
ΔT = difference in Temp.

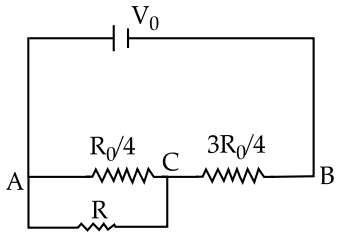
$$\frac{\Delta Q}{\Delta t} = \frac{385 \times A \times (100°C - \theta)}{l}$$

$$= \frac{50 \times A \times (\theta - 0°C)}{l}$$

$\Rightarrow$ $385\,(100°C - \theta) = 50(\theta - 0°C)$
$\Rightarrow$ $\theta = 88.5°C$

48. Option (1) is correct.

Explanation: The given diagram can be redrawn as follow:



The potential across AC,

$$V_{AC} = \frac{R_{AC}}{R_{BC} + R_{AC}} \times V_0$$

$$= \frac{\frac{RR_0}{4R + R_0}}{\frac{3R_0}{4} + \frac{RR_0}{4R + R_0}} \times V_0$$

$$= \frac{4RV_0}{3R_0 + 16\,R}$$

49. Option (1) is correct.

Explanation: A.T.Q, we have,

$$\frac{F_e}{F_G} = \frac{\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2}}{\frac{Gm_1m_2}{r^2}}$$

$$2.4 \times 10^{39} = \frac{K}{G} \times \frac{(1.6 \times 10^{-19})^2}{(9.1 \times 10^{-31} \times 1.67 \times 10^{-27})}$$

$$\left[\because K = \frac{1}{4\pi\varepsilon_0}\right]$$

Hence,

$$\frac{K}{G} = \frac{2.4 \times 10^{39} \times 9.1 \times 10^{-31} \times 1.67 \times 10^{-27}}{1.6 \times 10^{-19} \times 1.6 \times 10^{-19}}$$

$= 14.247 \times 10^{19}$
$= 1.4247 \times 10^{20} \approx 10^{20}$

50. Option (3) is correct.

Explanation: Given:

$$g = \frac{4\pi^2 L}{T^2}$$

L = (10 ± 0.1) cm, and
T = (100 ± 1) s

Hence, error in measurement of g is

$$\frac{\Delta g}{g} = \frac{\Delta L}{L} + 2\frac{\Delta T}{T}$$

$$= \frac{0.1}{10} \times 100 + 2 \times \frac{1}{100} \times 100$$

$$= 3\%$$

❑❑