

CHAPTERS [(1) TO (5)]

Read the questions carefully then answer according to the instructions given in each question:

1. Choose to answer (A) or (B): Mention the scientific term:

- A. It is the total work done to transfer unit charge throughout the circuit outside and inside the source.
 B. It is the total work done to transfer unit charge throughout the whole electric circuit outside the source only.

2. Choose to answer (A) or (B): Choose the correct answer:

A. The wavelength of maximum intensity will get _____ as an object gets _____.

- (A) hotter, shorter
 (B) longer, hotter
 (C) shorter, colder
 (D) shorter, hotter

B. The ratio between the energy of the photon to the velocity of light in air is the of the photon.

- (A) mass (B) momentum (C) frequency (D) kinetic energy

3. Choose to answer (A) or (B): What will happen when?

- A. Placing a plastic pieces instead of iron core inside a solenoid carrying AC of high frequency.
 B. Replacing the commutator in DC motor by slip rings.

4. Choose the correct answer: In the RLC circuit if ($V_L > V_C$)

- (A) the total voltage leads the current intensity by (θ).
 (B) the total voltage lags the current intensity by (θ).
 (C) the total voltage in phase with the current intensity.
 (D) the total voltage leads the current intensity by (90°).

5. Choose the correct answer:

The torque acting on a coil carrying current in a uniform magnetic field is maximum value so the value of magnetic dipole moment is

- (A) IAN^2 (B) I^2AN (C) IAN (D) IrN

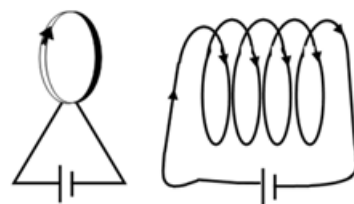
6. What is the scientific idea of the following? Fluorescent lamp.

7. Galvanometer of coil resistance (R_g) with maximum voltage (V_g) of 6V is connected to a multiplier of resistance ($5R_g$) to be converted into a voltmeter of a measuring range (V). **What** is the measuring range (V) of the voltmeter?

8. In a series RLC circuit, a generator provides an AC voltage of $V = 300V$. The components in the circuit have values $R = 480\Omega$, $X_L = 110\Omega$ and $X_C = 750\Omega$.

- 1) **What** is the value of the impedance? 2) **Find** the power consumed in the circuit.

9. A circular coil of diameter 20cm, 10 turns and produces a magnetic flux density in its center equals to 11×10^{-5} Tesla. **Calculate** the current which passes through the circular coil. If its turns are displaced formally to form a solenoid coil having length of 50cm. **Calculate** the magnetic flux density at a point in the interior axis. ($\mu = 4\pi \times 10^{-7} \text{ Wb/A.m}$) ($\pi = 22/7$).

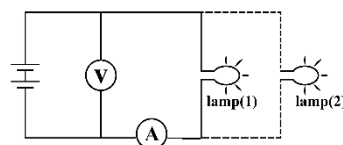


10. Choose to answer (A) or (B):

A. Choose the correct answer:

A lamp, voltmeter (V), Ammeter (A) and a battery with zero internal resistance are connected as shown, connecting another lamp (has the same resistance of the first one) in parallel with the first lamp as shown by dashed line would

- (A) increasing the ammeter reading. (B) decreasing the ammeter reading.
 (C) increasing the voltmeter reading. (D) decreasing the voltmeter reading.



B. Compare between: KCL and KVL (with respect to its definition).

11. Define: Wave theory.

TRIAL EXAM (I)

12. **Choose the correct answer:**

A solenoid of length 10cm consists of a wire wrapped tightly around a wooden core. The magnetic field strength is 4T inside the solenoid. If the solenoid is stretched to 25cm, what does the magnetic field become?

- (A) 1.6T (B) 10T (C) 20T (D) 4T

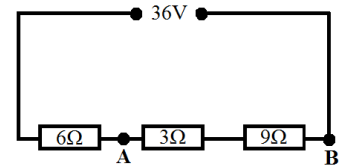
13. **Mention TWO factors affecting on:** Sensitivity of galvanometer.

14. **Define:** The photon.

15. **Choose the correct answer:**

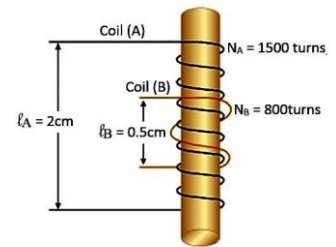
The circuit in the figure shows a 36V supply with ($r = 0$) connected across three resistors in series. The potential difference between the two points (A&B) is:

- (A) 12V (B) 6V (C) 24V (D) 36V



16. **Choose to answer (A) or (B):**

A. From the figure shown, if the current is changing in the coil (A), **calculate** the mutual inductance between the two coils when the area of each of them is $3.5 \times 10^{-4} \text{ m}^2$. ($\mu_{\text{air}} = 4\pi \times 10^{-7} \text{ Wb/A.m}$, $\pi = 22/7$)



B. A dynamo coil rotates 4200 rotation/minute in a magnetic field of flux density 0.05T. If the number of turns of coil is 100 turns and the area of each of them is 25 cm^2 : ($\pi = 22/7$)

- 1) **Find** the instantaneous emf when the coil rotates (1/12) rotation from zero position.
- 2) **Find** the instantaneous emf after (1/280) sec from the horizontal position.

17. The self induction coefficient 0.7H of a coil of zero resistance. The coil is connected to AC source of maximum voltage $100\sqrt{2} \text{ V}$ and frequency 40Hz. **Calculate:** ($\pi = 22/7$)

- 1) The inductive reactance.
- 2) The value of effective current in the circuit.

18. **Find** the magnitude of the force between two parallel wires 85cm long and 30cm apart, each carrying 60A in the same direction. Then **Mention** the type of the exerted force.

Knowing that ($\mu_{\text{air}} = 4\pi \times 10^{-7} \text{ Wb/A.m}$) ($\pi = 22/7$).

19. **Choose to answer (A) or (B): Give reason for:**

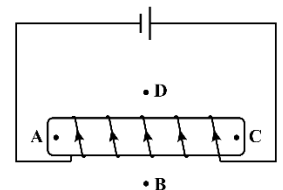
- A. In the hot wire ammeter, the wire is made very thin.
- B. Inductive reactance in the coil and capacitive reactance in capacitor do not consume any electric power.

20. **Choose to answer (A) or (B): Mention the physical quantity and ONE equivalent unit:** A. Ohm.sec. B. Tesla.m²/sec.

21. **Choose to answer (A) or (B): Choose the correct answer:**

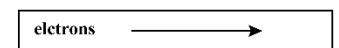
A. In the diagram shown, electric current is passed through a solenoid. The north pole of the solenoid is nearest to point

- (A) A (B) B
(C) C (D) D



B. Electrons beam is moving to the right in the conductor represented in the diagram. What is the direction of the magnetic field above the wire at point (P)?

- (A) Upward. (B) Downward.
(C) Into the page. (D) Out of the page.

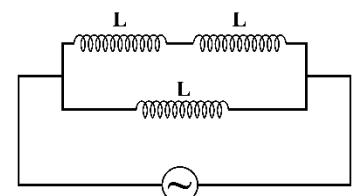


22. **Give reason for:** The electrical conductivity of different materials is different.

23. **Choose the correct answer:**

The circuit shown contains three coils of equal inductance (0.3H) with neglected the mutual induction between them and the equivalent reactance equals 12.56Ω , so the frequency of the AC source equals: ($\pi = 3.14$)

- (A) 10Hz (B) 20Hz (C) 60Hz (D) 50Hz

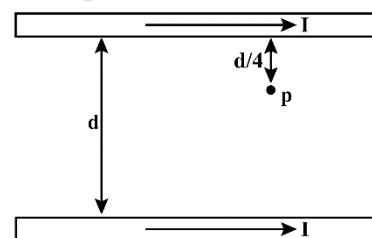


CHAPTERS [(1) TO (5)]

24. Choose the correct answer:

Two long thin parallel wires are separated by a distance (d) and each carry a current (I) to the right as shown. What is the net magnetic field due to these two wires at a point (P) located at distance ($d/4$) from upper wire?

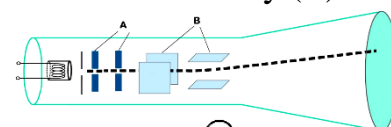
- (A) $2 \times 10^{-7} \left(\frac{3I}{8d}\right)$ Tesla. (B) $2 \times 10^{-7} \left(\frac{8I}{3d}\right)$ Tesla.
 (B) $2 \times 10^{-7} \left(\frac{3I}{d}\right)$ Tesla. (D) $2 \times 10^{-7} \left(\frac{I}{3d}\right)$ Tesla.



25. **Deduce** a relation for calculating the induced e.m.f. generated in a straight wire of length (L) moving with constant velocity (v) perpendicular to a uniform magnetic field of flux density (B).

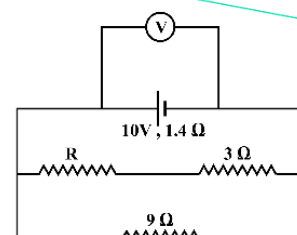
26. The figure shows a tube for cathode ray production.

- 1) **What** is the function of part (A)?
 2) Potential difference is applied between the two halves of part (B).



What effect does this have on the cathode rays?

27. In the opposite circuit the value of the voltmeter is 7.2V, **find** the value of (R).



28. Choose to answer (A) or (B): Give reason for:

- A. Ammeter is connected in series in a circuit.
 B. The cell connected to the ohmmeter should have a constant emf.

29. **What is meant by?** Electric power of a lamp = 60 Watt.

30. Choose the correct answer:

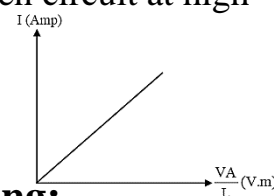
The ratio between the numbers of turns of the coils of a transformer that transfers 200V into 36V is 5:1, then the efficiency of the transformer is:

- (A) 95%. (B) 90%. (C) 80%. (D) 12.5%.

31. Give reason for:

AC circuit consists of coil and constant voltage source, the coil acts as open circuit at high frequencies, while it acts as short circuit at low frequencies.

32. Find the slope of the following graph:



33. Write down the mathematical formula represents the following:

The resonance frequency of RLC circuit.

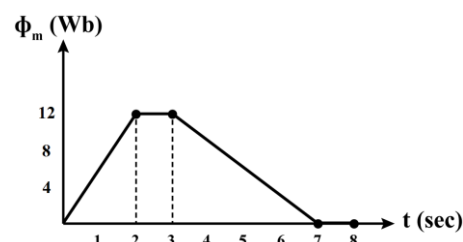
34. Choose to answer (A) or (B):

A. A coil of 20 turns, the magnetic flux passing through it has been changed through 7 seconds, using the graphical representation shown in the opposite figure, **calculate** the average induced emf:

- 1) From (0sec) to (2sec). 2) From (2sec) to (3sec).

B. A solenoid of area 25cm^2 and length 40cm, has number of turns per unit length is 80 turns/meter is wound on a cylindrical iron core ($\mu_{\text{iron}} = 1.5 \times 10^{-2} \text{Wb/Amp.m}$). If the current passing in it is 4A and the current vanishes in 0.04sec, **find**:

- 1) The self inductance. 2) The induced emf.



35. Answer the following:

1) Mention the scientific term:

It is the minimum photon energy needed to free an electron from the surface of the metal.

2) Choose the correct answer:

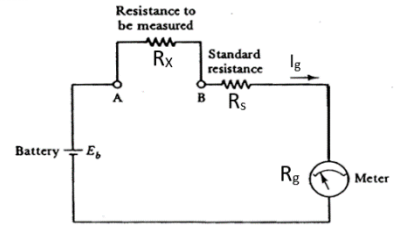
The ratio between associated wavelengths (λ_1/ λ_2) of a particle its mass (m) and other particle its mass ($2m$) both are moving with the same velocity is:

- (A) 0.25 (B) 0.5 (C) 1 (D) 2

TRIAL EXAM (I)

36. The ohmmeter shown in the figure is made up of a 1.5V battery, and a resistance R_s which $(R_s + R_g) = 15K\Omega$.

- 1) **Determine** the meter indication when $(R_X = 0)$.
- 2) **Determine** how the current scale should be marked at 0.75 FSD (full scale deflection).



37. **Choose to answer (A) or (B): Compare between:**

- A. The commutator in dynamo and the two graphite brushes in dynamo (with respect to its application).
- B. The coefficient of self-induction of a coil and the coefficient of mutual induction between two coils (with respect to ONE factor affecting).

38. **Choose the correct answer:**

The function of the fixed resistor in the ohmmeter is:

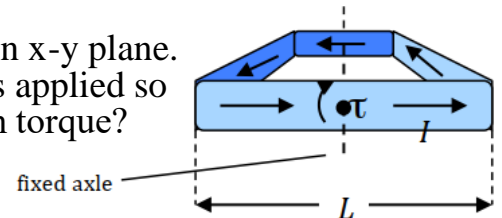
- (A) To measure large resistance.
- (B) To oppose to the graduated scale for the current.
- (B) To decrease the electric current intensity flowing through the instrument.
- (C) To obtain full-scale deflection of the instrument before inserting the unknown resistance.

39. **Give reason for:** When the power of home devices exceeds, the current in fuse increases.

40. **Choose the correct answer:**

A square loop of wire, with sides of length (L) , is oriented in x-y plane. The loop carries a current (I) , and constant magnetic field is applied so as to create a torque (τ) , what is the magnitude of maximum torque?

- (A) $\tau = IL^2B$
- (B) $\tau = (1/2)IL^2B$
- (C) $\tau = 2IL^2B$
- (D) $\tau = 4IL^2B$



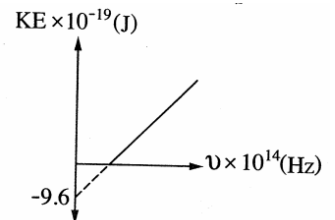
41. **Define:** Electric current.

42. **What is the necessary condition for?** Minimizing the power lost in transmission lines.

43. **Choose to answer (A) or (B):**

- A. 1) **Draw** a figure represents the DC Dynamo.
- 2) **Explain** the scientific idea of the DC Dynamo.
- B. 1) **Draw** a figure represents the DC Motor.
- 2) **Explain** the scientific idea of the DC Motor.

44. A photoelectric cell is used where different monochromatic light rays fall on the cathode and the opposite figure represents the relation between the kinetic energy of emitted electrons and the frequency of the incident light. (Velocity of light $(c) = 3 \times 10^8 \text{ m/s}$ and Planck's constant $(h) = 6.625 \times 10^{-34} \text{ J.s}$)



- 1) **Calculate** the critical wavelength of cathode's material.
- 2) **Calculate** the frequency of the incident light until the electron liberated from cathode surface acquires kinetic energy $9.6 \times 10^{-19} \text{ J}$.

45. In the AC circuit consists of inductive coil with non ohmic resistance, it is found that the inductive reactance (X_L) changes with the angular velocity (ω) according to the following table:

ω (rad/sec)	200	400	500	1000	1600	2000
X_L (Ω)	8	16	20	40	64	80

- 1) **Plot** a graphical representation of the relation between the inductive reactance (X_L) on Y-axis and the angular velocity (ω) on X-axis.
- 2) From the graph, **find** the value of inductive reactance at 800 rad/sec and the self-inductance of the coil.

With Best Wishes
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