

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 ONE application for:**

- A. Mutual induction between two coils. B. Electric motor.

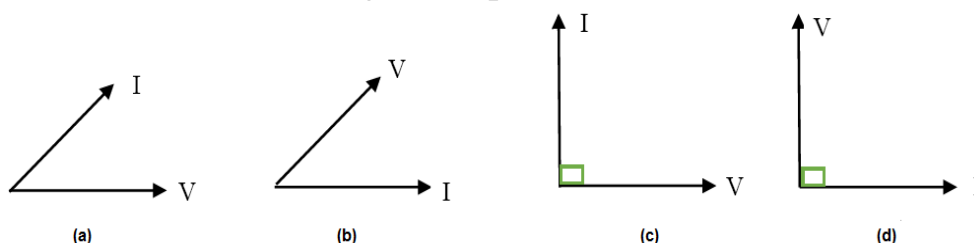
2. **Choose to answer (A) or (B): Choose the correct answer:**

- A. If the total resistance of an ammeter is (R) , the resistance of the shunt inside it is
 (A) less than (R) (B) more than (R) (C) equal to (R) (D) none of the previous
 B. A resistance of $2000\ \Omega$ is connected to the terminals of an ohmmeter. The ohmmeter pointer deflects to half of the current scale. What is the value of the resistance that if connected to ohmmeter terminals causes its pointer to deflect to quarter of current scale?
 (A) $4000\ \Omega$ (B) $6000\ \Omega$ (C) $8000\ \Omega$ (D) $10000\ \Omega$

3. **Choose to answer (A) or (B): Write down the mathematical expression for:**

- A. Law of conservation of mass – energy. B. De Broglie equation.

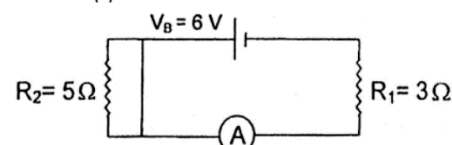
4. **Choose the correct answer:** Which diagram represents the vectors of the total voltage and the current in a circuit consisting of a capacitor, an ohmic resistance and an AC supply?



5. **Choose the correct answer:**

In the following figure the reading of ammeter is Ampere

- (A) 0.5 (B) 2 (C) 0.75 (D) 1.5



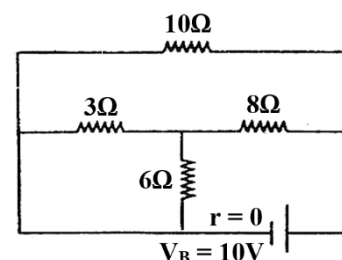
6. **Give reason for:** The galvanometer coil is connected to pair of spiral springs.

7. The coil of AC dynamo is composed of 420 turns and has cross sectional area $3 \times 10^{-3}\ \text{m}^2$ and resistance of $5\ \Omega$. The coil is rotating in a uniform magnetic field of flux density 0.5 Tesla. If the coil has started rotation from the position of being perpendicular to magnetic field lines and reached the position of generating the maximum emf after $1/200$ second. ($\pi = 22/7$)

- 1) Find the average electromotive force induced during the interval of $1/200$ second.
- 2) Find the effective value of the generated current when connecting an ohmic resistance $245\ \Omega$ to the dynamo brushes.

8. From the shown circuit. **Calculate:**

- 1) The equivalent resistance of the circuit.
- 2) The electric current intensity passing through $6\ \Omega$.



9. A sensitive galvanometer of coil resistance $490\ \Omega$ whose pointer deflects to full scale when a current of 0.002 Ampere passes through its coil. A shunt resistance of $10\ \Omega$ is connected to the galvanometer coil to convert it into an ammeter. **How** can the ammeter be converted into a voltmeter that can measure potential difference up to 10V?

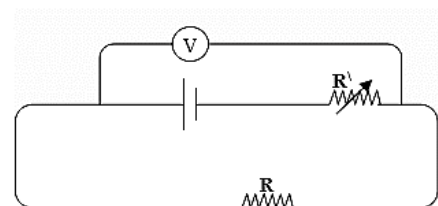
10. **Choose to answer (A) or (B):**

A. **Choose the correct answer:**

In the circuit shown in figure, if the resistance (R^1) increases, the reading of the voltmeter will

- (A) increase (B) decrease
 (C) remain constant (D) none of the above

B. **Compare between:** Kirchhoff's first and second law (with respect to scientific idea).



TRIAL EXAM (3)

11. **What is the idea or the method by which scientists could ...?**

Remote detection of the natural resources underground.

12. **Choose the correct answer:**

The average value of the current intensity (I) of the AC current during one cycle equals:

- (A) I_{eff} (B) I_{max} (C) Zero (D) There is no correct answer

13. **Give reason for:**

Movement of a straight wire carrying an electric current placed perpendicular on a magnetic flux.

14. **Define:** Potential difference across two points.

15. **Choose the correct answer:**

At the instant of generating the maximum emf in the dynamo coil, the angle between the coil plane and the direction of the magnetic flux

- (A) 0° (B) 45° (C) 90° (D) 180°

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

A. The alternating induced electromotive force that produced due to the rotation of a coil in a magnetic field is given by the relation ($\text{emf} = 180 \sin 18000t$). **Calculate:**

- 1) The effective induced electromotive force.
- 2) The frequency.

B. A solenoid consisting of 400 turns, each of cross sectional area 4cm^2 , is placed perpendicular to a uniform magnetic field of flux density 0.3 Tesla. **Calculate** the average induced electromotive force generated in the solenoid when:

- 1) The magnetic flux density increases to 0.5 Tesla through 2 millisecond.
- 2) The magnetic flux density decreases to 0.2 Tesla through 2 millisecond.

17. A rectangular coil of dimensions $20\text{cm} \times 10\text{cm}$ and of 200 turns placed in a regular field of magnetic flux density of 0.4T. A current of 3 Ampere is passing through the coil. **Calculate** the torque acting on the coil in the following two cases:

- 1) When the coil plane subtends an angle 60° to the direction of the field.
- 2) When the coil plane is perpendicular to the direction of the field.

18. Connecting an inductive coil of negligible ohmic resistance in series with AC source of emf 260V and hot wire ammeter, so the reading of the ammeter is 2A. If you know that the ratio between the potential difference across the ammeter's terminals and the potential difference across the coil's terminals is $5/12$, **find** the resistance of the hot wire ammeter.

19. **Choose to answer (A) or (B): What is meant by?**

- A. Threshold frequency. B. Wien's Law

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

- A. Weber/Ampere.sec B. Volt.sec/Ampere

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

A. Eddy currents are useful in designing

- (A) electric motor. (B) electric generator.
(C) induction furnaces. (D) the transformer.

B. At the instant when the coil of an AC dynamo is parallel to the direction of the magnetic flux, the value of the magnetic flux through the coil (ϕ) would be:

- (A) Maximum. (B) Zero. (C) Half maximum. (D) None of the previous.

22. **Write down the scientific term for the following:**

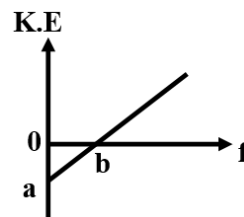
The magnetic flux density, which will exert a force of one Newton on a wire carrying current of 1 Ampere and length of 1m perpendicular to the magnetic field.

23. **What is the reason of** the irregularity of the scale in the ohmmeter?

CHAPTERS [(1) TO (5)]

24. **Choose the correct answer:** In the opposite graph, (K.E.) is the maximum kinetic energy of the emitted photoelectron and (f) is the frequency of incident light on a metal. So the ratio between the value of (a) and (b) is

(A) Planck's constant. (B) Critical frequency.
(C) Work function. (D) Photon energy.



25. **Show** how you can convert a moving coil galvanometer of resistance (R_g) and the maximum current that can flow through its coil (I_g) to a voltmeter for measuring a voltage ($V > V_g$).
26. An AC supply of voltage 20V and frequency $(400/11)$ Hz is connected to an inductive coil of self-inductance (L) and ohmic resistance 12Ω . If a current of effective value 1A passes through the coil, **find** its self-inductance. ($\pi = 22/7$)
27. An electric transformer is connected to an AC supply 220V having a current of effective value 10A through its primary coil. If the power produced in its secondary coil 1980W and the potential difference induced between its terminals is 22V, **find**:
- 1) The transformer efficiency.
 - 2) The resistance of the secondary circuit.

28. **Choose to answer (A) or (B): Mention the application of:**

A. Series connection of resistors. B. Parallel connection of resistors.

29. **When the following value = zero?**

The phase angle between the total voltage and the alternating current in RLC circuit.

30. **Choose the correct answer:**

In Compton effect, gamma photon is scattered and its increases.

(A) energy (B) speed (C) wavelength. (D) momentum

31. **Write down the scientific term indicates that:**

Self-inductance of a coil generates between its terminals induced emf of one volt when the current intensity passing through it changes at a rate of one ampere per one second.

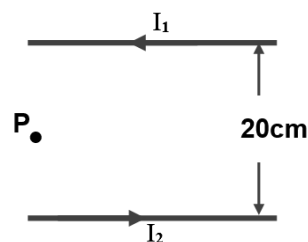
32. **Compare between:**

Effect of increasing light frequency and effect of increasing light intensity. (With respect to rate of electrons emitted by the effect of light incident on the metal surface.)

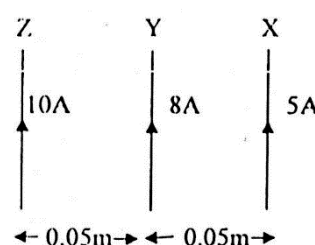
33. **Define:** Impedance of a circuit.

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

A. In the opposite figure, two parallel straight wires, the distance between them in air is 20 cm, electric current (I_1) passes through the first and the second ($I_2 = 10A$) in the given directions. If the total magnetic flux density at mid-point (P) is $6 \times 10^{-5}T$ between the two wires. **Find** the mutual force between them, if the length of each wire is 50cm. ($\mu_{air} = 4\pi \times 10^{-7} \text{ Wb/A.m}$)



B. The given figure represents three straight parallel wires (X, Y and Z) each of length 1m. The wires carry a current of 5A, 8A and 10A respectively in the directions shown. If the wire (Y) is 0.05m away from each of the wires (X) and (Z). **Calculate** the magnetic force acting on the wire (Y). [Knowing that $\mu_{air} = 4\pi \times 10^{-7} \text{ weber/A.m}$].



35. **Answer the following:**

- 1) **Mention the necessary condition for:**

Obtain maximum induced emf in a straight wire moving in a magnetic field.

- 2) **Choose the correct answer:**

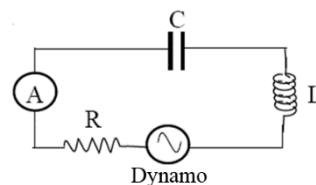
When the number of turns in the dynamo is doubled and its angular velocity (ω) decreases to quarter, the maximum electromotive force generated from it:

(A) increases to the double. (B) decreases to its half value.
(C) increases four times. (D) remains constant.

TRIAL EXAM (3)

36. The given electric circuit is at a state of resonance. **Show what would happen** to each of the following when the dynamo frequency is increased?

- 1) The ohmic resistance (R)? 2) The hot wire ammeter reading (A)?



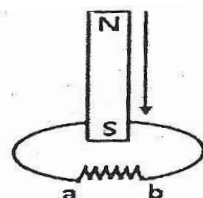
37. **Choose to answer (A) or (B): Give reason for:**

- A. The existence of a metal cylinder split into two insulated halves connected to the terminals of the electric motor coil.
B. The existence of an inductive coil in the fluorescent lamp circuit.

38. **Choose the correct answer:**

In the opposite figure, if the bar magnet is being moved towards the loop, then the potential of point (a) should be the potential of point (b) through the resistance terminals.

- (A) greater than (B) less than
(C) equal to (D) none of the above



39. **How could you increase?**

The frequency of a tuning circuit to double by changing the inductance of the coil only?

40. **Compare between:**

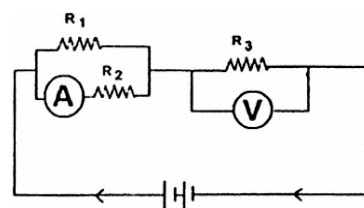
Photons and electrons from the point of view of the mass of each.

41. **What meant by?** The effective value of the current intensity = 0.5 Ampere.

42. **Mention ONE application:** Cathode ray tube.

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

- A. Three resistors (20, 40, 60) Ohm are connected to an electric current source. If the potential difference across each resistor is (50, 20, 30) Volt respectively, illustrate by drawing how these resistors could be connected. Then **calculate** the total resistance of the electric circuit.
B. The electric circuit shown in figure consists of $R_1 = 6\Omega$, $R_2 = 3\Omega$, $R_3 = 2\Omega$ and a battery whose internal resistance is one Ohm. If the current passing through (R_1) is 1A, **Calculate:**
1) The reading of the ammeter (A) and the reading of the voltmeter (V).
2) The emf of the battery.



44. An AC generator supplying a voltage of 30 Volts across its poles at frequency 400 Hertz is connected in series to a coil of inductance 0.06 Henry and a capacitor of capacitance 5 microfarad. If the total ohmic resistance in the circuit is 90 Ohms. ($\pi = 22/7$)

- 1) **Calculate** the impedance of the circuit.
2) **Find** the consumed power in the circuit.

45. The following table shows the relation between the magnetic flux density (B) produced around a straight wire carrying a current and the normal distance from the center of the wire to the measuring point (d).

B (Tesla)	10^{-5}	2×10^{-5}	3×10^{-5}	4×10^{-5}	5×10^{-5}
1/d (cm ⁻¹)	5	10	15	20	25

- 1) **Draw** a graph relating the magnetic flux density on y-axis and the reciprocal of the normal distance on x-axis then **deduce** the magnetic flux density at reciprocal of distance of 17.5cm⁻¹ from the wire.
2) From the graph, **find** the current flowing through the wire.

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