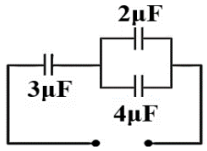
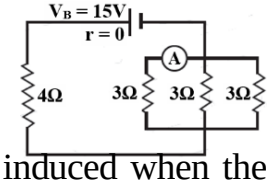
Read the questions carefully then answer according to the instructions given in each question:

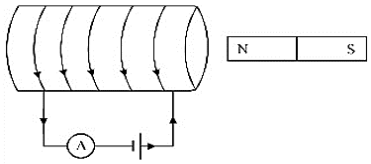
1. **Choose to answer (A) or (B): Mention the scientific term:**
   A. It is the point at which the total magnetic flux density is equal to zero.
   B. The scale deflection per unit current intensity flowing through the coil of a galvanometer.
2. **Choose to answer (A) or (B): Choose the correct answer:**
   A. Mass of photon during its motion is ……
   (A) Zero (B) E/c (C) $h\lambda/c^2$ (D) $h\upsilon/c^2$
   B. A monochromatic light falls on the surface of a metal and electrons are liberated from its surface. If the intensity of light increases, the number of liberated electrons ……
   (A) increases. (B) decreases. (C) remains constant. (D) equals to zero.
3. **Choose to answer (A) or (B): What will happen when?**
   A. Subjecting a metallic piece to a magnetic field due to alternating current of high frequency.
   B. Replacing the two metal rings in the dynamo by two halves of a hollow metallic cylinder insulated from each other.
4. **Choose the correct answer:**
   The total capacity of a group of capacitors connected as shown is …….



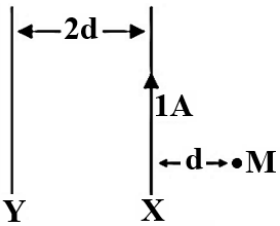
   (A) 2μF (B) 4.3μF (C) 6μF (D) 9μF
5. **Choose the correct answer:**
   In the circuit shown, the reading of the ammeter (A) is ……



   (A) 0.38A (B) 1A (C) 1.25A (D) 2.14A
6. **What is the application of the following?** Microwaves.
7. A coil of self-inductance 0.1H in which an electromotive force of 200V is induced when the current intensity through it drops from 5A to zero. **Find** the time taken by the current to vanish.
8. A sensitive galvanometer of coil's resistance 50Ω, gives full-scale deflection when a current of 0.002A flows through it, it is connected to a multiplier resistance of 450Ω to convert it into voltmeter. **What** is the maximum range of such voltmeter? If it is desired to use the voltmeter to measure the electric current intensity by connecting it with a shunt resistance 0.1Ω, **what** is the maximum current intensity that can be measured by it?
9. An inductive coil of ohmic resistance 10Ω and inductive reactance 40Ω is connected in series with a capacitor of capacitive reactance 25Ω and AC power supply of effective voltage 180V. **Calculate** the effective value of the alternating current that passes through the circuit.
10. **Choose to answer (A) or (B):**
    A. **Choose the correct answer:** In the opposite figure, when the magnet is moving away, the reading of ammeter:



    (A) Increases (B) Decreases
    (C) Remains unchanged (D) Equals zero
    B. **Compare between:** Fleming's right hand rule and lenz's rule (with respect to their use).
11. **What is the necessary condition for?**
    Terminal voltage on a battery smaller than the voltage of battery ($V < V_B$).
12. **Choose the correct answer:**
    In the opposite figure, two long parallel wires (X), (Y) separated by a normal distance 2d. The wire (X) carries current with intensity (I = 1A). What is the direction and the intensity of the current that passes in the wire (Y) to obtain total magnetic flux density at the point (M) equals to zero?



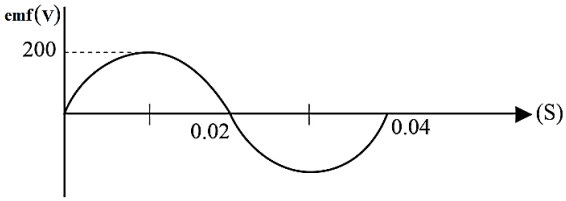
    (A) 2A, down (B) 2A, up (C) 3A, down (D) 3A, up
13. **Mention the factors affecting on:**
    The magnetic flux density at the center of a circular coil that carries an electric current.
14. **Define:** Photo-electric effect.

15. **Choose the correct answer:**

In the figure, a group of resistors are connected with each other. If the equivalent resistance of the group is 8Ω, therefore the value of resistance (R) is equal to:
(A) 9Ω (B) 7Ω (C) 4Ω (D) 2Ω

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

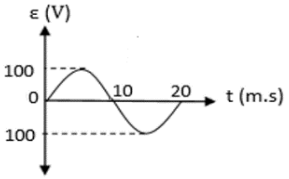
A. The figure shown represents the relation between the induced e.m.f (Volt) in a dynamo and the time (second), if the cross sectional area of the dynamo coil is $0.02m^2$ and the number of its turns 300 turns, ($\pi = 22/7$). **find:**



1) The angular velocity (ω)
2) Magnetic flux density.

B. Step-up transformer of efficiency 90%, whose primary coil is connected to an alternating electric source having e.m.f = 100 Volt. If the ratio between the currents in the secondary and primary coils is 1:20 respectively. **Calculate** the potential difference between the two ends of the secondary coil.

17. The diagram in the opposite figure represents the change in the electromotive force generated by an AC dynamo's coil which rotates with angular velocity (ω) during 20 msec, and connected to a capacitor of capacitance (C).



1) **Draw** the output wave representing the change in the electromotive force generated during 20msec when it rotates with angular velocity (2ω).
2) **Find** the ratio between the current before and after increasing the angular velocity of the dynamo's coil.

18. Monochromatic light falls on the surface of metal of work function 7.68×10^{-19}J and the energy of the incident photon is 9.28×10^{-19}J and electrons are emitted from the surface. **Calculate** the speed of emitted electrons, if mass of electron = 9.1×10^{-31}Kg.

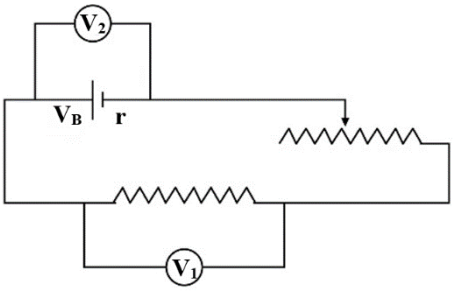
19. **Choose to answer (A) or (B): Give reason for:**

A. The galvanometer can't be used to measure the intensity of alternating current.
B. The ohmmeter scale is opposite to that of the ammeter.

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

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

A. In the opposite figure when the resistance of rheostat is increased, which of the following choices represents the change in the reading of voltmeters (V_1 and V_2):

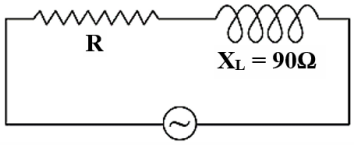


Choice	Reading of (V_1)	Reading of (V_2)
(A)	Increases	Increases
(B)	Decreases	Increases
(C)	Increases	Decreases
(D)	Decreases	Decreases

B. A group of lamps are connected in parallel with battery 12V and of negligible internal resistance, if the total current in the circuit = 6A and the resistance of each lamp = 6Ω therefore the number of lamps are:
(A) 7 (B) 5 (C) 3 (D) 2

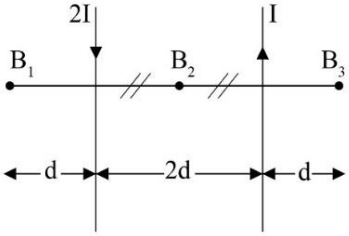
22. **Mention** only two factors affecting on magnetic dipole moment of a coil carrying electric current and placed in a uniform magnetic field.

23. **Choose the correct answer:** In the circuit shown, the value of the ohmic resistance which makes the total potential difference leads the current by an angle 42° equals:



(A) 134.5Ω (B) 121Ω (C) 99.955Ω (D) 90.95Ω

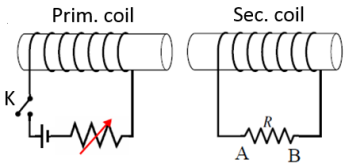
24. **Choose the correct answer:**
The figure shown represents two parallel wires, the normal distance between them in (2d), carry currents (2I) and (I) in the directions shown. Which of the following choices represents the relation between the values of the magnetic flux densities (B_1, B_2, and B_3)?



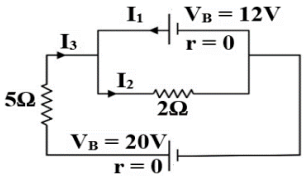
(A) $B_1 > B_2 > B_3$ (B) $B_2 > B_1 > B_3$
(C) $B_2 > B_3 > B_1$ (D) $B_3 > B_1 > B_2$

25. **Deduce** a relation for calculating the frequency of the oscillating circuit.

26. The opposite figure shows two adjacent solenoids, one of them is movable. **Determine six ways** that generate an induced current through the secondary coil across the resistance (R).



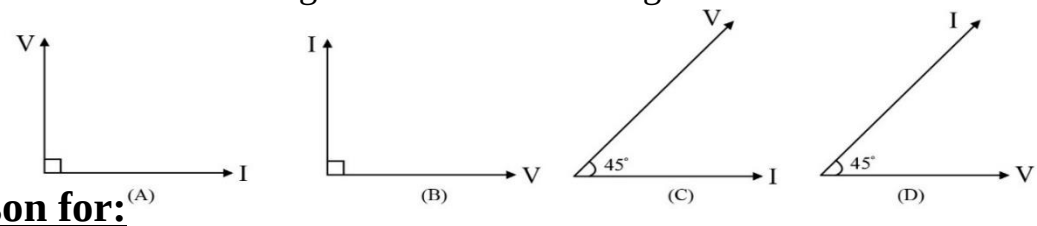
27. In the circuit shown in the figure, **calculate** the value of the current (I_2) and (I_3).



28. **Choose to answer (A) or (B): Give reason for:**
A. The value of the electric current in a closed circuit that contains a capacitor, a coil and an ohmic resistance reaches maximum at resonance.
B. The capacitor does not consume any power when connected to an AC supply.

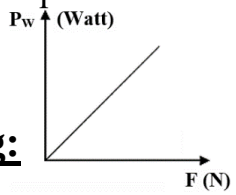
29. **What is meant by?** Electric conductivity of a substance.

30. **Choose the correct answer:** An electric circuit consists of an inductive coil and an ohmic resistance is connecting in series with AC source, if (X_L = R). Which of the figures below represents the vector diagram for the total voltage and current in the circuit:



31. **Give reason for:**
The average e.m.f. produced in the dynamo's coil during one complete cycle equals zero.

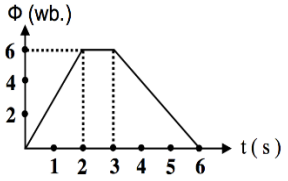
32. **Find the slope of the following graph:**



33. **Write down the mathematical formula represents the following:**
Ampere's circuital law.

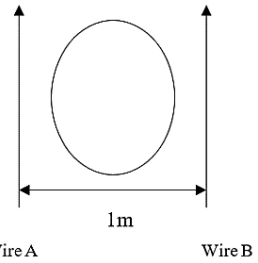
34. **Choose to answer (A) or (B):**
A. AC dynamo its coil consists of 500 turns the cross-section of each turn is 100cm^2 revolves at a rate 1500 revolution/minute in a uniform magnetic flux density of 4.2×10^{-3}T, where ($\pi = 22/7$). **Find**:
1) The electromotive force when the coil makes an angle 60° with the field direction.
2) The electromotive force generated in the coil after 0.02 second from the vertical position to the field.

B. The magnetic flux that passes through a coil of 200 turns changes during 6 seconds. Using the shown graph, **Calculate** the induced electromotive force during:
1) The first two seconds. 2) The last 3 seconds.



35. **Answer the following:**
    1) **Mention the scientific term:** It is the current generated in the conductor in a closed circuit due to the variation of the magnetic flux linked with the conductor.
    2) **Choose the correct answer:**
    The pointer of an ohmmeter deflects to one third of its scale when a resistance = (R) is connecting across its two ends, therefore the resistance of the ohmmeter equal to:
    (A) 3R (B) 2R (C) R (D) 0.5R

36. Two wires (A) and (B) are placed (1m) apart from each other. The intensity of current flowing through wire (A) is (4.5A) and that flowing through wire (B) is (1.5A) in the same direction. A circular coil of one turn and radius = (10π cm) is placed between the two wires in the same plane and its center is at a distance of (0.5m) from wire (A). **What** are the **intensity** and **direction** of the current passing through the circular coil such that the magnetic flux density at its center = zero? ($\mu = 4\pi\times10^{-7}$Wb/A.m)



37. **Choose to answer (A) or (B): Under what conditions the following values become zero:**
    A. The magnetic torque acting on the coil of the electric motor during its rotation.
    B. The value of induced instantaneous (emf) generated in the coil of AC dynamo during its rotation.

38. **Choose the correct answer:** The shunt resistance that is connected with the coil of the galvanometer to convert it to ammeter, leads to ……..
    (A) decrease the sensitivity of device only (B) increase the sensitivity of device only
    (C) increase sensitivity and range of device (D) decrease sensitivity and increase range

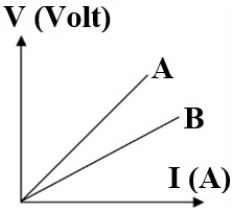
39. **Give reason for:** The temperature of the platinum-iridium wire becomes constant.

40. **Choose the correct answer:**
    The direction of electric current in the coil of electric motor is reversed every:
    (A) A quarter cycle. (B) A half cycle. (C) Three quarters cycle. (D) One complete cycle.

41. **Define:** Plank's distribution curve.

42. **What is meant by** Effective value of AC current?

43. **Choose to answer (A) or (B):**
    A. You have three electric lamps of equal electric resistance. **Illustrate by drawing, how** they could be connected together in an electric circuit with an electric cell of negligible internal resistance such that: The luminous intensity of the three lamps is maximum and then the luminous intensity is minimum.
    B. The graph represents the relation between voltage and current through two metal wires (A) and (B) that are of same material and with same length, **which** of the two wires has:
    1) More resistance?
    2) Greater cross sectional area?



44. **Calculate** the wavelength associated with the motion of an electron, given that its velocity 2×10^5m/s, mass of electron $= 9.1\times10^{-31}$ Kg and Planck's constant $= 6.625\times10^{-34}$ J S.

45. A wire of length 1m and carries a current (I) A is placed in a uniform magnetic field of magnetic flux density 4T whose direction makes an angle (θ) with the wire, the table below illustrates the relation between the force (F) acting on the wire and an electric current (I) passing through it.

F (N)	10	14	18	22	26
I (A)	5	7	9	11	13

    1) **Plot** a graph between F (N) on the vertical axis and current I (A) on the horizontal axis.
    2) From the graph, **find** the angle (θ) between the direction of the magnetic field and the wire.

With Best Wishes
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