

NEET PHYSICS 2018-19 - Chennai

Periodic Test : 15

Number of questions: 150

Name: _____

ID No: _____

Test ID : 027

Test date: 04.04.2019

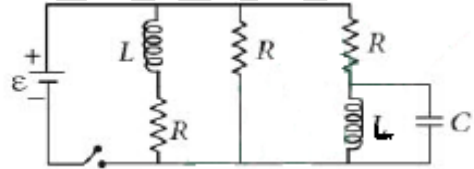
Time: 3HRS

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

1. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At the center of the solenoid, a coil of 100 turns and radius 0.01 m is placed with its axis coinciding with solenoid axis. The current in the solenoid reduces at a constant rate to 0 A from 4A in 0.5 s. If the resistance of the coil is $10 \pi^2 \Omega$, the total charge flowing through the coil during this time is

- a) $16 \mu\text{C}$
- b) $32 \mu\text{C}$
- c) $16\pi \mu\text{C}$
- d) $32\pi \mu\text{C}$

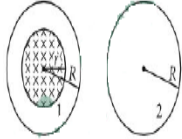
2. Figure shows a circuit that contains three identical resistors with resistance $R=9.0 \Omega$ each, two identical inductors with inductance $L=2.0 \text{ mH}$ each, and an ideal battery with e.m.f. $\epsilon=18\text{V}$. The current i through the battery just after the switch closed is



- a) 0.2 A
- b) 2 A
- c) 0 ampere
- d) 2Ma

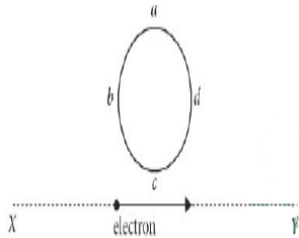
3. Which of the following combinations should be selected for better turning of an L-C-R circuit used for communication?
- a) $R=20\Omega, L=1.5 \text{ H}, C=35 \mu\text{F}$
 - b) $R=25\Omega, L=2.5 \text{ H}, C=45 \mu\text{F}$
 - c) $R=15\Omega, L=3.5 \text{ H}, C=30 \mu\text{F}$
 - d) $R=25\Omega, L=1.5 \text{ H}, C=45 \mu\text{F}$

4. A uniform magnetic field is restricted within a region of radius r . The magnetic field changes with time at a rate dB/dt . Loop 1 of radius $R > r$ encloses the region r and loop 2 of Radius R is outside the region of magnetic field as shown in the figure. Then the e.m.f. generated is



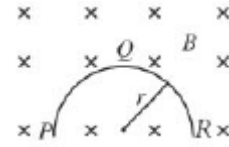
- a) Zero in loop 1 and zero in loop 2
 b) $-dB/dt \pi r^2$ in loop 1 and $-dB/dt \pi R^2$ in loop 2
 c) $-dB/dt \pi R^2$ in loop 1 and zero in loop 2
 d) $-dB/dt \pi r^2$ in loop 1 and zero in loop 2
5. The potential differences across the resistance, capacitance and inductance are 80 V, 40 V and 100 V respectively in an L-C-R circuit. The power factor of the circuit is
- a) 0.4
 b) 0.5
 c) 0.8
 d) 1.0
6. An inductor 20mH, a capacitor 50 μ F and a resistor 40 Ω are connected in series across a source of emf $V = 10 \sin 340t$. The power loss in A.C circuit is
- a) 0.76 W
 b) 0.89 W
 c) 0.51 W
 d) 0.67 W
7. A small signal voltage $V(t) = V_0 \sin \omega t$ is applied across an ideal capacitor C
- a) Current $I(t)$ is in phase with voltage $V(t)$
 b) Current $I(t)$ leads voltage $V(t)$ by 180°
 c) Current $I(t)$, lags voltage $V(t)$ by 90°
 d) Over a full cycle the capacitor C does not consume any energy from the voltage source.
8. A long solenoid has 1000 turns. When a current of 4 A flows through it, the magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self inductance of the solenoid is
- a) 2 H
 b) 1 H
 c) 4 H
 d) 3 H
9. A series R-C circuit is connected to an alternating voltage source. Consider two situations:
- i. When capacitor is air filled
 ii. When capacitor is mica filled
 Current through resistor is i and voltage across capacitor is V then
- a) $i_a > i_b$
 b) $V_a = V_b$
 c) $V_a < V_b$
 d) $V_a > V_b$

10. An electron moves on a straight line path XY as shown. The $abcd$ is a coil adjacent to the path of electron. What will be the direction of current, if any, induced in the coil?



- a) The current will reverse its direction as the electron goes past the coil
- b) No current induced
- c) $abcd$
- d) $adcb$
11. A resistance 'R' draws power 'P' when connected to an AC source. If an inductance is now placed in series with the resistance, such that the independence of the circuit becomes 'Z', the power drawn will be
- a) $P(R/Z)$
- b) P
- c) $P(R/Z)^2$
- d) $P(R/Z)^{1/2}$

12. A thin semicircular conducting ring (PQR) of radius r is falling with its plane vertical in a horizontal magnetic field B , as shown in the figure.



The potential difference developed across the ring when its speed is v , is

- a) Zero
- b) $Bv\pi r^2/2$ and P is at higher potential
- c) πrBv and R is at high potential
- d) $2rBv$ and R is at higher potential
13. A transformer having efficiency of 90% is working on 200 V and 3kW power supply. If the current in the secondary coil is 6A, the voltage across the secondary coil and the current in the primary coil respectively are
- a) 300 V, 15 A
- b) 450 V, 15 A
- c) 450 V, 13.5 A
- d) 600 V, 15 A
14. A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f. is
- a) Four times per revolution
- b) Six times per revolution
- c) Once per revolution
- d) Twice per revolution

15. A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when

- a) A capacitance of reactance $X_c = X_L$ is included in the same circuit.
- b) An iron rod is inserted in the coil
- c) Frequency of the AC source is decreased
- d) Number of turns in the coil is reduced

16. The primary of a transformer when connected to a dc battery of 10 volt draws a current of 1 mA. The number of turns of the primary and secondary windings are 50 and 100 respectively. The voltage in the secondary and the current drawn by the circuit in the secondary are respectively

- a) 20 V and 2.0 mA
- b) 10 V and 0.5 mA
- c) Zero volt and therefore no current
- d) 20 V and 0.5 mA

17. A current of 2.5 A flows through a coil of inductance 5 H. The magnitude flux linked with the coil is

- a) 0.5 Wb
- b) 12.5 Wb
- c) Zero
- d) 2 Wb

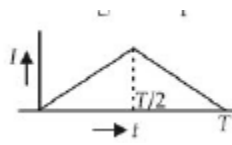
18. A coil of resistance 400Ω is placed in a magnetic field. If the magnetic flux ϕ (Wb) linked with the coil varies with time t (sec) as $\phi = 50t^2 + 4$. The current in the coil at $t = 2$ sec is

- a) 0.5 A
- b) 0.1 A
- c) 2 A
- d) 1 A

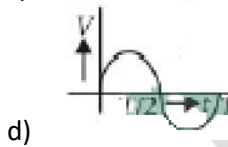
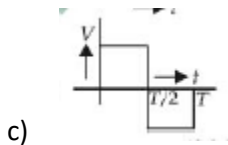
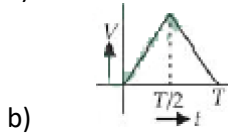
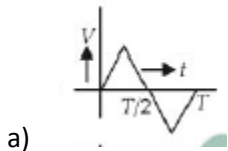
19. In an electrical circuit R, L, C and ac voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\frac{\pi}{2}$. If instead, C is removed from the circuit, the phase difference is again $\frac{\pi}{2}$. The power factor of the circuit is

- a) $\frac{1}{2}$
- b) $\frac{1}{\sqrt{2}}$
- c) 1
- d) $\frac{\sqrt{3}}{2}$

20. The current (i) in the inductance is varying with time according to the plot shown in figure.



Which one of the following is the correct variation of voltage with time in the coil?



21. The instantaneous values of alternating current and voltages in a circuit are given as

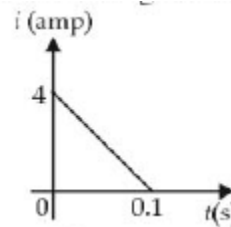
$$i = 1/\sqrt{2} \sin(100\pi t) \text{ ampere}$$

$$e = 1/\sqrt{2} \sin(100\pi t + \pi/3) \text{ volt}$$

The average power in watts consumed in the circuit is

- a) $\frac{1}{4}$
 b) $\frac{\sqrt{3}}{4}$
 c) $\frac{1}{2}$
 d) $\frac{1}{8}$

22. In a coil of resistance 10Ω , 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

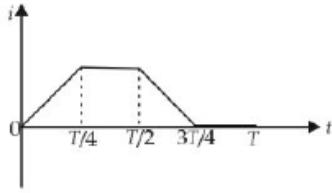
23. An AC voltage is applied to a resistance R and an inductor L in series. If R and the inductive reactance are both equal to 3Ω , the phase difference between the applied voltage and the current in the circuit is

- a) $\pi/6$
 b) $\pi/4$
 c) $\pi/2$
 d) zero

24. In an AC circuit an alternative voltage volts is connected to a capacitor of capacity $1\mu\text{F}$. The r.m.s value of the current in the circuit is

- a) 10mA
 b) 100 mA
 c) 200 mA
 d) 20 mA

25. The current i in a coil varies with time as shown in the figure. The variation of induced emf with time would be



- a)
- b)
- c)
- d)

26. A step-up transformer operates on a 230 V line and supplies a load of 2 ampere. The ratio of the primary and secondary windings is
- 15 A
 - 50 A
 - 25 A
 - 12.5 A

27. Two coils have a mutual inductance 0.005H. The current changes in the first coil according to equation $I = I_0 \sin \omega t$, where $I_0 = 10$ A and $\omega = 100 \pi$ rad/sec. The maximum value of e.m.f. in the second coil is
- π
 - 5π
 - 2π
 - 4π

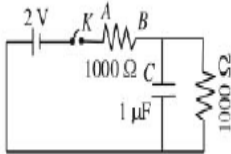
28. The primary winding of a transformer has 500 turns where its secondary has 5000 turns. The primary is connected to an A.C supply 20V, 50 Hz. The secondary will have an output of
- 2 V, 50 Hz
 - 2 V, 5 Hz
 - 200 V, 50 Hz
 - 200 V, 500 Hz

29. In an AC circuit with phase voltage V and current I , The power dissipated is
- $V \cdot I$
 - Depends on phase angle between V and I
 - $\frac{1}{2} \cdot V \cdot I$
 - $\frac{1}{\sqrt{2}} \cdot V \cdot I$

30. A metal ring is held horizontally and bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet is
- More than g
 - Equal to g
 - Less than g
 - Either a) or c)

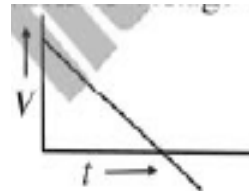
31. In an AC circuit, the current flowing is $i = 5 \sin(100t - \pi/2)$ ampere and the potential difference is $V = 200 \sin(100t)$ volts. The power consumption is equal to
- 20 W
 - 0 W
 - 1000 W
 - 40 W

32. When the key K is pressed at time $t = 0$, then which of the following statement about the current I in the resistor AB of the given circuit is true?



- I oscillates between 1 mA and 2 mA
 - At $t=0$, $I=2$ mA and with time it goes to 1 mA
 - $I=1$ mA at all t
 - $I=2$ mA at all t
33. A straight line conductor of length 0.4 m is moved with a speed of 7m/s perpendicular to a magnetic field of intensity 0.9 Wb/m^2 . The induced e.m.f across the conductor is
- 5.04 V
 - 25.2 V
 - 1.26 V
 - 2.52 V

34. The current I in an AC circuit with inductance coil varies with time according to the graph given below



-
-
-
-

35. In an AC circuit, I_{rms} and I_0 are related as
- $I_{\text{rms}} = \pi I_0$
 - $I_{\text{rms}} = \sqrt{2} I_0$
 - $I_{\text{rms}} = I_0 / \pi$
 - $I_{\text{rms}} = I_0 / \sqrt{2}$

36. A series of L-C-R circuit is connected to a source of AC current. At resonance, the phase difference between the applied voltage and the current in the circuit is
- π
 - Zero
 - $\pi/4$
 - $\frac{\pi}{2}$
37. Two cables of copper are of equal lengths. One of them has a single wire of area of cross-section A , while other has 10 wires of cross-sectional area $A/10$ each. Give their suitability for transporting AC and DC
- Only multiple strands for AC, either for DC
 - Only multiple strands for AC, only single strand for DC
 - Only single strand for DC, either for AC
 - Only single strand for AC, either for DC
38. If N is the number of turns in a coil, the value of self inductance varies as
- N^0
 - N
 - N^2
 - N^{-2}
39. What is the self inductance of a coil which produces 5 mV when the current changes from 3 ampere to 2 ampere in one millisecond?
- 5000 henry
 - 5 milli-henry
 - 50 henry
 - 5 henry
40. The time constant of C-R circuit is
- $1/CR$
 - C/R
 - CR
 - R/C
41. The total charge, induced in a conducting loop when it is moved in magnetic field depend on
- The rate of change of magnetic flux
 - Initial magnetic flux only
 - The total change in magnetic flux
 - Final magnetic flux only
42. A rectangular coil of 20 turns and area of cross-section 25 sq.cm has a resistance of 100Ω . If a magnetic field which is perpendicular to the plane of coil changes at a rate of 1000 tesla per second, the current in the coil is
- 1A
 - 50A
 - 0.5A
 - 5A

43. Faradays laws are consequences of conservation of
- Energy
 - Energy and magnetic field
 - Charge
 - Magnetic fields
44. If the number of turns per unit length of a coil of solenoid is doubled, the self inductance of the solenoid will
- Remain unchanged
 - Be halved
 - Be doubled
 - Become four times
45. A 100 milli henry coil carries a current of 1A. Energy stored in its magnetic field is
- 0.5 J
 - 1 A
 - 0.05 J
 - 0.1 J
46. A magnetic field of 2×10^{-2} T acts at right angles to a coil of area 100 cm^2 , with 50 turns. The average emf induced in the coil is 1 V, when it is removed from the field in t sec, The value of t is
- 10 s
 - 0.1 s
 - 0.01 s
 - 1 s
47. The current in the self inductance $L=40$ mH is to be increased uniformly from 1 amp to 11 amp in 4 milliseconds. The emf induced in inductor during process is
- 100 V
 - 0.4 V
 - 4 V
 - 440 V
48. An inductor may store energy in
- Its electric field
 - Its coils
 - Its magnetic field
 - Both in electric and magnetic fields
49. In a region of magnetic induction $B=10^{-2}$ tesla, a circular coil of radius 30 cm and resistance π^2 ohm is rotated about an axis which is perpendicular to the direction of B and which forms a diameter of the coil. If the coil rotates at 200 rpm the altitude of the alternating current induced in the coil is
- $4 \pi^2$ mA
 - 30 mA
 - 6 mA
 - 200 mA
50. Eddy current is produced when
- A metal is kept in varying magnetic field
 - A metal is kept in steady magnetic field
 - A circular coil is placed in a magnetic field
 - Through a circular coil, current is passed.