1.

The current in an L – R circuit builds up to $(3/4)^{th}$ of its steady state value in 4 seconds. The time constant of this circuit is?

1. $\frac{1}{\ln 2}$sec
2. $\frac{2}{\ln 2}$sec
3. $\frac{3}{\ln 2}$sec
4. $\frac{4}{\ln 2}$sec

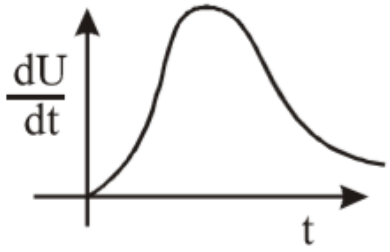
2.

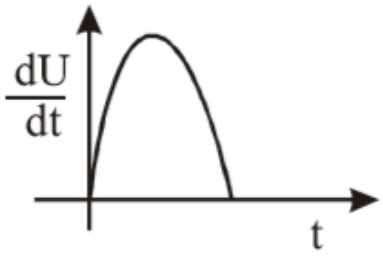
An emf of 15 volt is applied in a circuit containing 5 henry inductance and 10 ohm resistance. The ratio of the currents at time t = ∞ and at t = 1 second is?

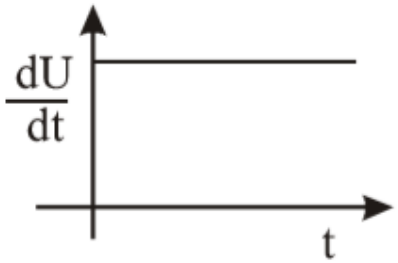
1. $\frac{e^{1/2}}{e^{1/2}-1}$
2. $\frac{e^2}{e^2-1}$
3. $1 - e^{-1}$
4. e^{-1}

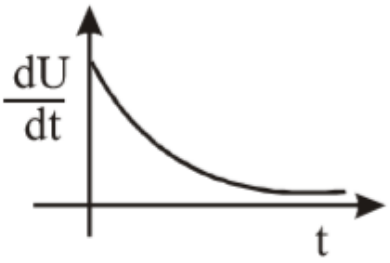
3.

Rate of increment of energy in an inductor with time in series LR circuit getting charge with battery of emf E is best represented by – [inductor has initially zero current]

1. 

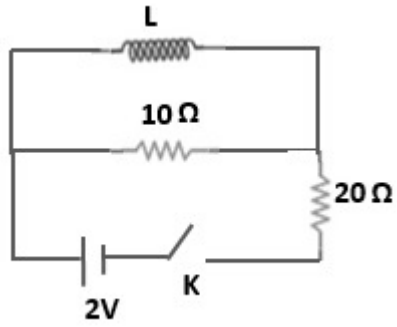
2. 

3. 

4. 

4.

The key K is inserted at time t= 0. The initial (t=0) and final $(t \to \infty)$ currents through battery are :



1. $\frac{1}{15} Amp,\ \frac{1}{10} Amp$
2. $\frac{1}{10} Amp,\ \frac{1}{15} Amp$
3. $\frac{2}{15} Amp,\ \frac{1}{10} Amp$
4. $\frac{1}{15} Amp,\ \frac{2}{25} Amp$

5.

The core of a transformer is laminated to reduce energy losses due to

(1) Eddy currents

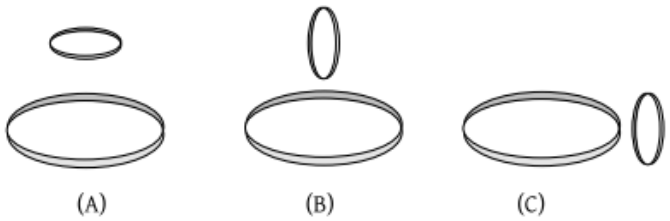
(2) Hysteresis

(3) Resistance in winding

(4) None of these

6.

Two circular coils can be arranged in any of the three situations shown in the figure. Their mutual inductance will be:



(1) Maximum in situation (A)

(2) Maximum in situation (B)

(3) Maximum in situation (C)

(4) The same in all situations

7.

Calculate the self-inductance of a solenoid having 1000 turns and length 1m. The area of cross-section is 7 cm^2 and μ_r = 1000.

1. 888 H
2. 0.88 H
3. 0.088 H
4. 88.8 H

8.

Eddy currents are produced in a material when it is?

1. heated.
2. placed in an electric field.
3. placed in a uniform constant magnetic field.
4. placed in a time-varying magnetic field.

9.

Two coils have a mutual inductance of 5mH. The current changes in the first coil according to the equation $I = I_0 \cos\omega t$, where I_0 = 10 A and $\omega = 100\pi$ rad/s. The maximum value of e.m.f. induced in the second coil is?

1. 5π Volt
2. 2π Volt
3. 4π Volt
4. π Volt

10.

The current through a choke coil increases from zero to 6A in 0.3 seconds and an induced emf of 30 V is produced. The inductance of the coil is?

1. 5H
2. 2.5H
3. 1.5H
4. 2H

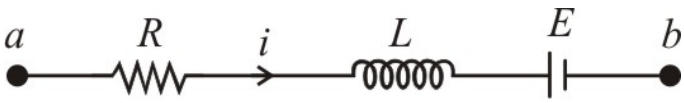
11.

A small circular loop of radius r is placed inside a circular loop of radius R (R >> r). The loops are coplanar and their centres coincide. The mutual inductance of the system is proportional to

1. r/R
2. r^2/R
3. r/R^2
4. r^2/R^2

12.

In the circuit diagram shown in figure, R = 10Ω , L = 5H, E = 20V and i = 2A. This current is decreasing at a rate of 1.0 A/s. V_{ab} at this instant will be:-



1. 40V
2. 35V
5. 30V
4. 45V

13.

The current passing through a choke coil of self inductance 5 H is decreasing at the rate of 2 A/s. The e.m.f. develop across the coil is?

1. 10 V
2. -10 V
3. -2.5 V
4. 2.5 V

14.

When the number of turns in a solenoid are doubled without any change in the length of the solenoid, its self inductance becomes?

1. Half
2. Double
3. Four times
4. Eight times

15.

A coil of resistance 20 ohms and inductance 5 H has been connected to a 100 volt battery. The energy stored in the coil is?

1. 31.25 J
2. 62.5 J
3. 125 J
4. 250 J

16.

An inductor is connected to a direct voltage source through a switch. Now

1. Very large emf is induced in inductor when switch is closed

2. Larger emf is induced when switch is opened

3. Large emf is induced whether switch is closed or opened

4. No emf is induced whether switch is closed or opened

17.

A long solenoid has self inductance L. If its length is doubled keeping total number of turns constant then its new self inductance will be:

1. $\frac{L}{2}$

2. 2L

3. L

4. $\frac{L}{4}$

18.

With the decrease of current in the primary coil from 2 A to zero in 0.01s, the e.m.f. generated in the secondary coil is 1000 V. The mutual inductance of the two coil is?

1. 1.25 H

2. 2.50 H

3. 5.00 H

4. 10.00 H

19.

The coefficient of self induction of two inductor coils are 20 mH and 40 mH respectively. If the coils are connected in series so as to support each other and the resultant inductance is 80 mH then the value of mutual inductance between the coils will be:

1. 5 mH

2. 10 mH

3. 20 mH

4. 40 mH

20.

A coil and a bulb are connected in series with a 12 volt direct current source. A soft iron core is now inserted in the coil. Then

1. The intensity of the bulb remains the same

2. The intensity of the bulb decreases

3. The intensity of the bulb increases

4. Nothing can be said

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