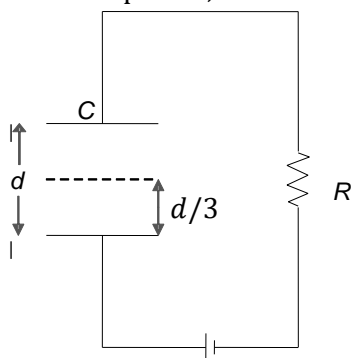# DPP
DAILY PRACTICE PROBLEMS

Class : XIIth

Date :

Subject : PHYSICS

DPP No. :4

## Topic :-Alternating Current

1. If coefficient of self induction of a coil is 1 H, an emf of 1 V is induced, if
   a) Current flowing is 1 A
   b) Current variation rate is $1\ As^{-1}$
   c) Current of 1 A flows for one sec
   d) None of the above

2. A parallel plate capacitor C with plates of unit area and separation d is filled with a liquid of dielectric constant $K = 2$. The level of liquid is $\frac{d}{3}$ initially. Suppose the liquid level decreases at a constant speed v, the time constant as a function of time t is.

   a) $\dfrac{6\varepsilon_0 R}{5d + 3vt}$
   b) $\dfrac{(15d + 9vt)\varepsilon_0 R}{2d^2 - 3dvt - 9v^2 t^2}$
   c) $\dfrac{6\varepsilon_0 R}{5d - 3vt}$
   d) $\dfrac{(15d - 9vt)\varepsilon_0 R}{2d^2 + 3dvt - 9v^2 t^2}$

3. If the coils of a transformer are made up of thick wire, then
   a) Eddy currents loss will be more
   b) Magnetic flux leakage is reduced
   c) Joule's heating loss is increased
   d) Joule's heating loss is reduced

4. The peak value of 220 $volts$ of ac mains is
   a) 155.6 $volts$
   b) 220.0 $volts$
   c) 311.0 $volts$
   d) 440 $volts$

5. An alternating $e$mf is applied across a parallel combination of a resistance R, capacitance C and an inductance L. If I_R, I_L, I_C are the current through R, L and C respectively, then the diagram which correctly represents the phase relationship among I_R, I_L, I_C and source $e$mf E, is given by
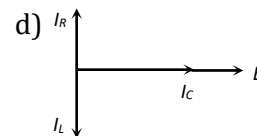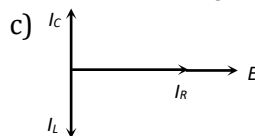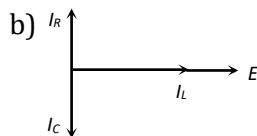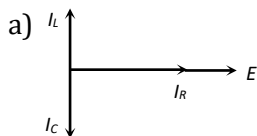
6. The time constant of the given circuit is
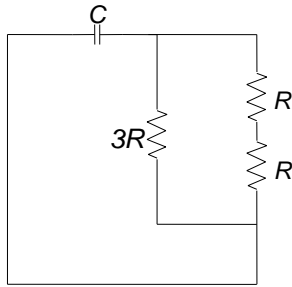
a) $\dfrac{3RC}{5}$ b) $\dfrac{6RC}{5}$ c) $\dfrac{5RC}{6}$ d) None of these

7. A solenoid has 2000 turns wound over a length of 0.30 m. The area of its cross section is 1.2×10^{-3} m^2. Around its central section, a coil of 300 turns is wound. If an initial current of 2 A in the solenoid is reversed in 0.25 s, then the emf induced in the coil is equal to

a) 6×10^{-4} V b) 4.8×10^{-2} V c) 6×10^{-2} V d) 48 kV

8. The potential difference V and the current i flowing through an instrument in an ac circuit of frequency f are given by $V = 5\cos \omega t\ volts$ and $I = 2\sin \omega t\ amperes$ (where $\omega = 2\pi f$). The power dissipated in the instrument is

a) Zero b) $10\ W$ c) $5\ W$ d) $2.5\ W$

9. An $e.m.f.$ $E = 4\cos(1000t)\ volt$ is applied to an LR-circuit of inductance $3\ mH$ and resistance $4\ ohms$. The amplitude of current in the circuit is

a) $\dfrac{4}{\sqrt{7}}A$ b) $1.0\ A$ c) $\dfrac{4}{7}A$ d) $0.8\ A$

10. A coil of inductive reactance 31Ω has a resistance of 8Ω. It is placed in series with a condenser of capacitative reactance 25Ω. The combination is connected to an a.c. source of $110\ volt$. The power factor of the circuit is

a) 0.80 b) 0.33 c) 0.56 d) 0.64

11. The expression for magnetic induction inside a solenoid of length L, carrying a current i and having N number of turns is

a) $\dfrac{\mu_0}{4\pi}\dfrac{N}{L}i$ b) $\mu_0 NLi$ c) $\dfrac{\mu_0}{4\pi}NLi$ d) $\mu_0 \dfrac{N^2}{L}i$

12. In an LR-circuit, the inductive reactance is equal to the resistance R of the circuit. An $e.m.f.$ $E = E_0\cos(\omega t)$ is applied to the circuit. The power consumed in the circuit is

a) $\dfrac{E_0^2}{R}$ b) $\dfrac{E_0^2}{2R}$ c) $\dfrac{E_0^2}{4R}$ d) $\dfrac{E_0^2}{8R}$

13. In an AC circuit, the current lags behind the voltage by $\pi/3$. The components of the circuit are

a) R and L b) L and C c) R and C d) Only R

14. The instantaneous value of current in an A.C. circuit is $I = 2\sin(100\pi t + \pi/3)\ A$. The current will be maximum for the first time at

a) $t = \dfrac{1}{100}s$ b) $t = \dfrac{1}{200}s$ c) $t = \dfrac{1}{400}s$ d) $t = \dfrac{1}{600}s$

15. A resistor R, an inductor L and a capacitor C are connected in series to an oscillator of frequency n, if the resonant frequency is n_r, then the current lags behind voltage, when

a) $n = 0$ b) $n < n_r$ c) $n = n_r$ d) $n > n_r$

16. During a current change from 2 A to 4 A in 0.05 s, 8 V of emf is developed in a coil. The coefficient of self-induction is

   a) 0.1 H   b) 0.2 H   c) 0.4 H   d) 0.8 H

17. In an $L - R$ circuit shown in above figure switch S is closed at time $t = 0$. If e denotes the induced emf across inductor and i, the current in the circuit at any time t, then which of the following graphs, figure shows the variation of e with i?

   a)   b)   c)   d)
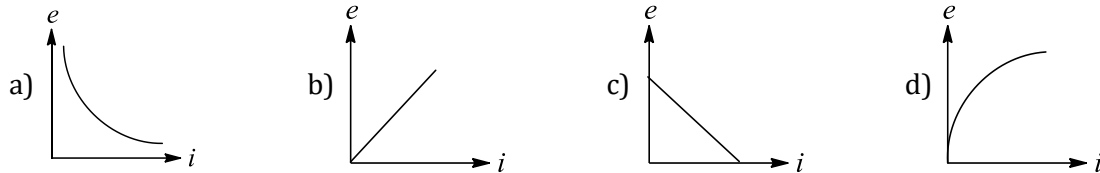
18. Let C be the capacitance of a capacitor discharging through a resister R. Suppose t_1 is the time taken for the energy stored in the capacitor to reduce to half its initial value and t_2 is the time taken for the charge to reduce to one-fourth its initial value. Then the ratio $\frac{t_1}{t_2}$ will be

   a) 1   b) $\frac{1}{2}$ c) $\frac{1}{4}$ d) 2

19. The phase difference between the current and voltage of LCR circuit in series combination at resonance is

   a) 0   b) $\pi/2$ c) π d) $-\pi$

20. The impedance of a circuit consists of 3 ohm resistance and 4 ohm reactance. The power factor of the circuit is

   a) 0.4   b) 0.6   c) 0.8   d) 1.0