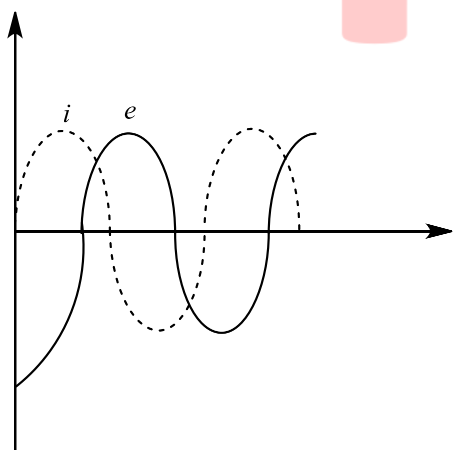
DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. :5**

Topic :-Alternating Current

1. A 220 V, 50 Hz ac source is connected to an inductance of 0.2 H and a resistance of 20 ohm in series. What is the current in the circuit
 a) 10 A b) 5 A c) 33.3 A d) 3.33 A
2. A transformer is having 2100 turns in primary and 4200 turns in secondary. An AC source of 120 V, 10 A is connected to its primary. The secondary voltage and current are
 a) 240 V,5 A b) 120 V, 10 A c) 240 V, 10 A d) 120 V, 20 A
3. If instantaneous current is given by $i = 4\cos(\omega t + \phi)$ $amperes$, then the $r.m.s$ value of current is
 a) 4 amperes b) $2\sqrt{2}$ amperes c) $4\sqrt{2}$ amperes d) Zero amperes
4. When an AC source of emf $e = E_0\sin(100t)$ is connected across a circuit, the phase difference between the emf e and the current i in the circuit is observed to be $\frac{\pi}{4}$, as shown in the diagram. If the circuit consists possibly only of $R - C$ or $R - L$ or $L - C$ in series, find the relationship between the two elements



 a) $R = 1\text{ k}\Omega, C = 10\ \mu\text{F}$ b) $R = 1\text{ k}\Omega, C = 1\ \mu\text{F}$ c) $R = 1\text{ k}\Omega, L = 10\text{ H}$ d) $R = 1\text{ k}\Omega, L = 1\text{ H}$
5. If a current I given by $I_0\sin\left(\omega t - \frac{\pi}{2}\right)$ flows in an ac circuit across, which an ac potential of $E = E_0\sin\omega t$ has been applied, then the power consumption P in the circuit will be
 a) $P = \frac{E_0 I_0}{\sqrt{2}}$ b) $P = \sqrt{2}E_0 I_0$ c) $P = \frac{E_0 I_0}{2}$ d) $P = 0$

6. A resistance R, inductance L and capacitor C are connected in series to an oscillator of frequency f. If resonant frequency is f, then current will lag the voltage when

a) $f = 0$ b) $f < f_r$ c) $f = f_r$ d) $f > f_r$

7. A generator produces a voltage that is given by $V = 240\sin 120\ t$, where t is in seconds. The frequency and $r.m.s.$ voltage are

a) 60 Hz and 240 V b) 19 Hz and 120 V c) 19 Hz and 170 V d) 754 Hz and 70 V

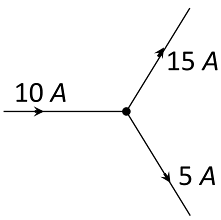
8. A 50 V AC is applied across an R-C (series) network. The rms voltage across the resistance is 40 V, then the potential across the capacitance would be

a) 10 V b) 20 V c) 30 V d) 40 V

9. An alternating voltage $e = 200\sin 100\ t$ is applied to a series combination $R = 30\ \Omega$ and an inductor of 400 mH. The power factor of the circuit is

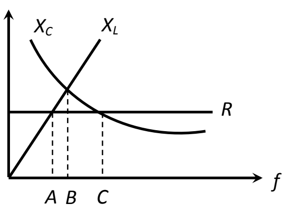
a) 0.01 b) 0.2 c) 0.05 d) 0.6

10. Is it possible



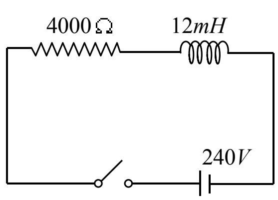
a) Yes b) No
c) Cannot be predicted d) Insufficient data to reply

11. The figure shows variation of R,X_L and X_C with frequency f in a series L, C, R circuit. Then for what frequency f in a series L, C, R circuit. Then for what frequency point, the circuit is inductive



a) A b) B c) C d) All points

12. In the inductive circuit given in the figure, the current rises after the switch is closed. At instant when the current is 15 mA, then potential difference across the inductor will be

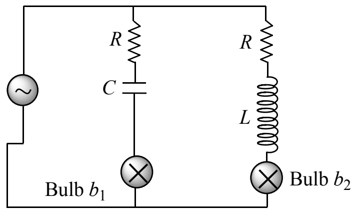


a) Zero b) 240V c) 180V d) 60V

13. If L and R represent inductance and resistance respectively, then dimension of L/R will be

a) $[ML^0T^0]$ b) $[M^0L^0T^{-1}]$ c) $[M^0L^0T^{-2}]$ d) $[M^0LT^{-2}]$

14. Two identical incandescent light bulbs are connected as shown in figure. When the circuit is an AC voltage source of frequency f, which of the following observation will be correct



a) Both bulbs will glow alternatively

b) Both bulbs will glow with same brightness provided $f = \frac{1}{2\pi}\sqrt{(1/LC)}$

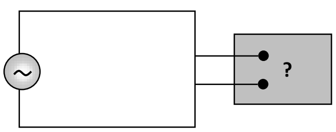
c) Bulb b_1 will light up initially and goes off, bulb b_2 will be ON constantly

d) Bulb b_1 will blink and bulb b_2 will be ON constantly

15. When a coil carrying a steady current is short circuited, the current in it, decreases η time in time t_0. The time constant of the circuit is

a) $\frac{t_0}{In\,\eta}$ b) $\frac{t_0}{\eta - 1}$ c) t_0 In η d) $\frac{t_0}{\eta}$

16. Following figure shows an ac generator connected to a "block box" through a pair of terminals. The box contains possible R, L, C or their combination, whose elements and arrangements are not known to us. Measurements outside the box reveals t



$e = 75 \sin(\sin \omega t)\, volt$,

$i = 1.5\sin(\omega t + 45°) amp$. The wrong statement is

a) There must be a capacitor in the box b) There must be an inductor in the box

c) There must be a resistance in the box d) The power factor is 0.707

17. An $L - C - R$ circuit of $R = 100\ \Omega$ is connected to an AC source 100 V, 50 Hz. The magnitude of phase difference between current and voltage is 30°. The power dissipated in the $L - C - R$ circuit is

a) 50 W b) 86.6 W c) 100 W d) 200 W

18. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f. The current leads the voltage by 45°. The value of C is

a) $\frac{1}{2\pi f\ (2\pi f L + R)}$ b) $\frac{1}{\pi f\ (2\pi f L + R)}$ c) $\frac{1}{2\pi f\ (2\pi f L - R)}$ d) $\frac{1}{\pi f\ (2\pi f L - R)}$

19. If the total charge stored in the LC circuit is Q_0, then for $t \geq 0$

a) The charge on the capacitor is $Q = Q_0 \cos\left(\frac{\pi}{2} + \frac{t}{\sqrt{LC}}\right)$

b) The charge on the capacitor is $Q = Q_0 \cos\left(\frac{\pi}{2} - \frac{t}{\sqrt{LC}}\right)$

c) The charge on the capacitor is $Q = -LC\frac{d^2Q}{dt^2}$

d) The charge on the capacitor is $Q = \frac{1}{\sqrt{LC}}\frac{d^2Q}{dt^2}$

20. In $L-C-R$ series circuit the resonance condition in terms of capacitive reactance (X_C) and inductive reactance (X_L) is

a) $X_C + X_L = 0$ b) $X_C = 0$ c) $X_L = 0$ d) $X_C - X_L = 0$