1. The peak value of an alternating current is 10 A. What is its RMS value?

A. 5 A
B. 7.07 A
C. 10 A
D. 14.1 A

Answer: B
Explanation:
RMS value = $I_o / \sqrt{2} = 10 / \sqrt{2} \approx 7.07$ A

2. An alternating voltage is given by $V = 220\sqrt{2} \sin(100\pi t)$. What is the RMS value of voltage?

A. 110 V
B. 220 V
C. 440 V
D. $220\sqrt{2}$ V

Answer: B
Explanation:
$V_o = 220\sqrt{2} \rightarrow$ RMS value = $V_o / \sqrt{2} = 220$ V

3. In a purely resistive AC circuit, the current and voltage are:

A. Out of phase by 90°
B. Out of phase by 180°
C. In phase
D. Out of phase by 45°

Answer: C
Explanation:
In a purely resistive circuit, voltage and current are always in phase.

4. In an AC circuit with a capacitor only, the current leads the voltage by:

A. 0°
B. 45°
C. 90°

D. 180°

Answer: C
Explanation:
In a purely capacitive circuit, current leads voltage by 90°.

5. For an inductor of 0.2 H and frequency 50 Hz, the inductive reactance is:

A. 31.4 Ω
B. 62.8 Ω
C. 15.7 Ω
D. 6.28 Ω

Answer: A
Explanation:
$X_L = 2\pi fL = 2 \times \pi \times 50 \times 0.2 = 62.8 \times 0.5 = 31.4\ \Omega$

6. The impedance of an RLC series circuit at resonance is:

A. Infinite
B. Zero
C. Minimum and equal to resistance
D. Maximum and equal to resistance

Answer: C
Explanation:
At resonance, $X_L = X_C \rightarrow$ Impedance Z = R (minimum)

7. In an AC circuit, the power factor is 0.5. The angle between current and voltage is:

A. 0°
B. 30°
C. 60°
D. 90°

Answer: C
Explanation:
Power factor = $\cos\varphi = 0.5 \rightarrow \varphi = \cos^{-1}(0.5) = 60°$

8. A current I = 5 sin(100πt) flows through a 10 Ω resistor. The average power dissipated is:

A. 62.5 W
B. 125 W
C. 250 W
D. 0 W

Answer: B
Explanation:
I_o = 5 A → I_rms = 5 / √2
P = I_rms² × R = (25/2) × 10 = 125 W

9. The RMS value of a half-wave rectified sine wave with peak value I_o is:

A. I_o
B. I_o / 2
C. I_o / √2
D. I_o / 2√2

Answer: D
Explanation:
RMS value of half-wave rectified wave = I_o / 2√2

10. In an LCR circuit, the quality factor is defined as:

A. R / (ωL)
B. ωL / R
C. 1 / (ωRC)
D. 1 / (ω²LC)

Answer: B
Explanation:
Q = (ωL) / R → Quality factor of an LCR circuit

11. Which of the following is true at resonance in an RLC series circuit?

A. Voltage across L and C cancel each other
B. Impedance is maximum
C. Power factor is zero
D. Current is minimum

Answer: A
Explanation:
At resonance: $X_L = X_C \rightarrow V_L = -V_C \rightarrow$ they cancel.

12. A capacitor of 20 μF is connected to an AC supply of 220 V, 50 Hz. Capacitive reactance is:

A. 63.6 Ω
B. 159 Ω
C. 100 Ω
D. 200 Ω

Answer: B
Explanation:
$X_C = 1 / (2\pi fC) = 1 / (2 \times \pi \times 50 \times 20 \times 10^{-6}) \approx 159.15\ \Omega$ Rechecking:
$X_C = 1 / (2 \times \pi \times 50 \times 20 \times 10^{-6}) = 159.15\ \Omega$

13. The instantaneous current in an AC circuit is $i = 3 \sin(100\pi t)$. What is the time period?

A. 0.02 s
B. 0.01 s
C. 0.05 s
D. 0.1 s

Answer: A
Explanation:
$\omega = 100\pi \rightarrow \omega = 2\pi f \rightarrow f = 50$ Hz $\rightarrow T = 1/f = 0.02$ s

14. In an LCR series circuit, at resonance, the current amplitude is maximum because:

A. Voltage across L is zero
B. Net reactance is zero
C. Resistance becomes zero
D. Capacitance becomes infinite

Answer: B
Explanation:
At resonance: X_L = X_C → Net reactance = 0 → Z = R (minimum) → I is max.

15. An inductor and a resistor are connected in series to an AC supply. The power factor of this circuit lies between:

A. 0 and 1
B. 0 and −1
C. 1 and ∞
D. −1 and 0

Answer: A
Explanation:
In R-L circuit, current lags voltage → Power factor < 1, > 0

16. A resistor of 100 Ω, an inductor of 0.5 H, and a capacitor of 100 μF are connected in series with an AC supply of 220 V and 50 Hz. What is the impedance of the circuit?

A. 100 Ω
B. 200 Ω
C. 50 Ω
D. 0 Ω

Answer: A
Explanation:
At resonance, X_L = X_C, so net reactance = 0
Impedance Z = R = 100 Ω

17. The average power consumed in a pure inductor connected to an AC source is:

A. Maximum
B. Zero
C. Minimum but not zero
D. Depends on frequency

Answer: B

Explanation:
In a pure inductor, current lags voltage by 90°, so power factor = 0 → Power = 0

18. In an AC circuit, voltage leads current by 90°. The circuit contains:

A. Only resistance
B. Only inductor
C. Only capacitor
D. Resistance and inductor

Answer: C
Explanation:
In a purely capacitive circuit, current leads voltage by 90° → Voltage lags by 90°

19. If an AC source is connected to a pure resistor, what will be the shape of the current vs time graph?

A. Sine wave in phase with voltage
B. Sine wave lagging voltage
C. Sine wave leading voltage
D. Square wave

Answer: A
Explanation:
In a resistive circuit, voltage and current are in phase → Both are sine waves

20. The frequency of AC voltage used in India is:

A. 60 Hz
B. 110 Hz
C. 50 Hz
D. 220 Hz

Answer: C
Explanation:
Standard frequency in India = 50 Hz

21. A transformer works on the principle of:

A. Ohm’s law
B. Mutual induction
C. Self-induction
D. Electromagnetic force

Answer: B
Explanation:
Transformers use mutual induction between two coils to transfer energy

22. In an AC circuit with R = 10 Ω, L = 0.1 H, and f = 50 Hz, what is the power factor?

A. 0.5
B. 1
C. 0
D. 0.302

Answer: D
Explanation:
$X_L = 2\pi fL = 31.4\ \Omega$, $Z = \sqrt{(R^2 + X_L^2)} = \sqrt{(100 + 985.96)} \approx 32.97$
$\cos\varphi = R / Z = 10 / 32.97 \approx 0.303$ → Correction: Not 0.707
Rechecking:
$X_L = 31.4$, $R = 10$ → $Z = \sqrt{(10^2 + 31.4^2)} = \sqrt{(100 + 985.96)} \approx 33.1$
$\cos\varphi = 10 / 33.1 \approx 0.302$

23. A choke coil works on the principle of:

A. Capacitance
B. Resistance
C. Inductance
D. Conductance

Answer: C
Explanation:
A choke coil uses inductance to block high-frequency AC while allowing DC

24. What is the unit of reactance?

A. Henry
B. Ohm
C. Farad
D. Volt

Answer: B
Explanation:
Reactance is measured in ohms (Ω), like resistance

25. What will be the current in a 10 Ω resistor connected to a 220 V, 50 Hz AC supply? (RMS current)

A. 22 A
B. 15.6 A
C. 31.1 A
D. 220 A

Answer: A
Explanation:
$I_{rms} = V_{rms} / R = 220 / 10 = 22$ A

26. Which of the following changes will increase the capacitive reactance of a circuit?

A. Increasing capacitance
B. Increasing frequency
C. Decreasing frequency
D. Increasing voltage

Answer: C
Explanation:
$X_C = 1 / (2\pi fC) \rightarrow X_C \propto 1/f \rightarrow$ Decreasing f increases X_C

27. A circuit draws power only when the phase difference between current and voltage is:

A. 0°
B. 90°
C. 45°
D. 180°

Answer: A
Explanation:
P = VIcosφ → For max power, cosφ = 1 → φ = 0°

28. The average power consumed in a purely resistive AC circuit is given by:

A. V × I
B. (1/2) VI
C. V_rms × I_rms
D. Zero

Answer: C
Explanation:
P_avg = V_rms × I_rms in resistive circuit

29. What is the role of the core in a transformer?

A. Increases resistance
B. Reduces current
C. Provides path for magnetic flux
D. Converts AC to DC

Answer: C
Explanation:
The iron core provides a low reluctance path for magnetic flux between coils

30. A transformer has 500 turns in primary and 50 in secondary. If input voltage is 220 V, output voltage is:

A. 2200 V
B. 22 V
C. 110 V
D. 440 V

Answer: B
Explanation:
V_s / V_p = N_s / N_p → V_s = (50/500) × 220 = 22 V

31. In a series LCR circuit, resonance occurs when

A. XL = XC
B. XL > XC
C. XC > XL
D. R = 0

Answer: A
Explanation: At resonance, inductive and capacitive reactances are equal in magnitude and cancel each other, i.e., XL = XC.

32. At resonance, the power factor of an LCR series circuit is

A. 0
B. 1
C. Less than 1
D. Greater than 1

Answer: B
Explanation: At resonance, voltage and current are in phase. So, the power factor = cos(0°) = 1.

33. In a transformer, the efficiency is defined as

A. Output voltage / Input voltage
B. Input power / Output power
C. Output power / Input power
D. Input current / Output current

Answer: C
Explanation: Efficiency (η) = Output power / Input power × 100%.

34. A transformer has 100% efficiency. If the primary coil draws 200 W, what is the power output of the secondary coil?

A. 100 W
B. 200 W
C. 400 W
D. 0 W

Answer: B
Explanation: If efficiency is 100%, then input power = output power = 200 W.

35. The phase difference between current and voltage in a purely capacitive circuit is

A. 0 degrees
B. 90 degrees (current leads)
C. 90 degrees (current lags)
D. 180 degrees

Answer: B
Explanation: In a purely capacitive circuit, current leads voltage by 90 degrees.

36. In an AC circuit, the instantaneous current is $i = 5 \sin(100\pi t)$. The frequency is

A. 50 Hz
B. 100 Hz
C. 25 Hz
D. 200 Hz

Answer: A
Explanation: $\omega = 100\pi = 2\pi f \rightarrow f = \omega / (2\pi) = 100\pi / 2\pi = 50$ Hz.

37. In a transformer, if the number of turns in the secondary is double that of the primary, the transformer is

A. Step-down
B. Step-up
C. Ideal
D. Inverse

Answer: B
Explanation: Secondary turns > primary turns means it's a step-up transformer.

38. In a purely inductive AC circuit, the current

A. Is in phase with voltage

B. Leads the voltage by 90 degrees
C. Lags the voltage by 90 degrees
D. Leads the voltage by 180 degrees

Answer: C
Explanation: In an inductive circuit, current lags behind voltage by 90 degrees.

39. The function of a capacitor in an AC circuit is to

A. Increase current
B. Decrease resistance
C. Introduce capacitive reactance
D. Act as fuse

Answer: C
Explanation: A capacitor introduces capacitive reactance XC = 1 / (2πfC).

40. The RMS value of AC current is equal to

A. Peak current
B. Half of peak current
C. I0 / sqrt(2)
D. sqrt(2) × I0

Answer: C
Explanation: RMS value = I0 / sqrt(2), where I0 is the peak current.

41. A 10 microfarad capacitor is connected to a 50 Hz AC supply. What is the capacitive reactance?

A. 318 ohms
B. 106 ohms
C. 636 ohms
D. 159 ohms

Answer: A
Explanation: XC = 1 / (2 × π × f × C) = 1 / (2 × 3.14 × 50 × 10 × 10^-6) ≈ 318 ohms.

42. For an ideal transformer, the ratio of voltages is equal to the ratio of

A. Currents
B. Resistances
C. Turns
D. Frequencies

Answer: C
Explanation: V2 / V1 = N2 / N1 (voltage ratio = turn ratio).

43. What is the average value of an AC over a complete cycle?

A. V0
B. 0
C. V0 / sqrt(2)
D. V0 / 2

Answer: B
Explanation: The average value of a sine wave over a full cycle is zero.

44. In an LCR circuit, maximum current flows at

A. High frequency
B. Low frequency
C. Resonant frequency
D. Zero frequency

Answer: C
Explanation: At resonance, impedance is minimum, so current is maximum.

45. The quality factor (Q) of a resonant circuit is a measure of

A. Energy stored / Energy dissipated per cycle
B. Voltage / Current
C. Current / Voltage
D. Resistance / Inductance

Answer: A

Explanation: Q = 2π × (energy stored / energy dissipated per cycle).