قائمة الاسئلة

اختبار النهائي للعام الجامعي 2025/2024مـكلية الهندسة :: دوائر كهربائية 2- كلية الهندسة - قسم الطبية الحيوية - المستوى الثاني- 3ساعات - درـ

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1) Which of the following factors can affect the shape of a sine wave?
   1) - Amplitude only
   2) - Frequency only
   3) + Both amplitude and frequency
   4) - None of the above
2) What is the correct mathematical expression for a sine wave if the RMS value is 7.07 V and the frequency is 50Hz?
   1) + 10 sin (100π t)
   2) - 10 cos (2π * 50 t)
   3) - 7.07 sin (2π * 50 t)
   4) - 7.07 cos (2π t)
3) If the frequency is 60 Hz and the wave starts at zero volts at 0°, what is the first time the wave will reach its peak value?
   1) - 1/120 seconds
   2) - 1/60 seconds
   3) - 1/100 seconds
   4) + 1/240 seconds
4) If the peak-to-peak voltage of a sine wave is 141.5 V, what is the RMS value of this wave?
   1) - 100 V
   2) - 70.75 V
   3) + 50 V
   4) - 200 V
5) If the distance between the capacitor plates is doubled, the capacitance will become:
   1) - Twice the original value
   2) + Half the original value
   3) - Remain unchanged
   4) - Equal to zero
6) Which of the following capacitors can withstand the highest voltage?
   1) + Ceramic capacitors
   2) - Electrolytic capacitors
   3) - Plastic-film capacitors
   4) - Thin-layer capacitors
7) An uncharged capacitor and a resistor are connected in series with a switch and a 12 V battery. At the instant the switch is closed, the voltage across the capacitor is
   1) - 12 V
   2) - 6 V
   3) - 24 V
   4) + 0 V
8) Why is an inductor often wound around a ferromagnetic core?
   1) - To reduce self-inductance
   2) + To increase inductance
   3) - To increase resistance
   4) - To minimize current variation
9) How do non-magnetic materials affect inductance?
   1) - Significantly increase it
   2) - Reduce it to zero

3) + Do not affect it
4) - Prevent magnetic field formation

10) Which of the following reduces parasitic capacitance in an inductor?
1) - Decreasing spacing between turns
2) - Using thicker wire
3) + Increasing spacing between turns
4) - Using a high-permeability core material

11) What determines the winding resistance in an inductor?
1) - Only the number of turns
2) + Wire material and length
3) - Magnetic flux density
4) - Core resistance

12) **An inductor and a resistor are in series with a sinusoidal voltage source. The frequency is set so that the inductive reactance is equal to the resistance. If the frequency is increased, then**
a. $V_R > V_L$
b. $V_L < V_R$
c. $V_L = V_R$
d. $V_L > V_R$

1) - a
2) - b
3) - c
4) + d

13) If resistance increases in a circuit with both resistance and capacitive reactance, the phase angle?
1) - Increases
2) + Decreases
3) - Remains the same
4) - Becomes 90°

14) The unit of true power is?
1) - VAR
2) + Watt (W)
3) - Volt-Ampere (VA)
4) - Ohm (Ω)

15) In an AC circuit where the phase angle between voltage and current increases, the power factor?
1) - Increases
2) - Remains constant
3) + Decreases
4) - Is always 1

16) In a certain series resonant circuit, VC = 150 V, VL = 150 V, and VR = 50 V. The value of the source voltage is
1) - 150 V
2) - 300 V
3) + 50 V
4) - 350 V

17) At steady-state, the inductor acts as:
1) - An open circuit
2) - A variable resistor
3) - A fixed resistor
4) + Almost a short circuit

18) In an RL circuit where the final current is 10 A, what is the current in the coil after 5 tau?
1) - 8.5 A
2) + 9.93 A
3) - 6.3 A
4) - 7.5 A

19) **$(5\angle 45°)(2\angle 20°)$ is equal to**

a. $7 \angle 65°$
b. $10 \angle 25°$
c. $10 \angle 65°$
d. $7 \angle 25°$

1) - a
2) - b
3) + c
4) - d

20) In a series RC circuit, the voltage across the resistance is
1) - In phase with the source voltage
2) - Lagging the source voltage by 90°
3) + In phase with the current
4) - Lagging the current by 90°

21) In a parallel RL circuit, there are 2 mA rms in the resistive branch and 2 mA rms in the inductive branch. The total rms current is
1) - 4 mA
2) - 5.66 mA
3) - 2 mA
4) + 2.83 mA

22) The power factor in a series RLC circuit at resonance is?
1) - 0
2) + 1
3) - Dependent on R
4) - Dependent on L and C

23) The total reactance of a series RLC circuit at resonance is
1) + zero
2) - equal to the resistance
3) - infinity
4) - capacitive

24) In a series RLC circuit, if inductive reactance is greater than capacitive reactance, the phase angle is?
1) + Positive
2) - Negative
3) - Zero
4) - Depends on R only

25) A Thevenin ac equivalent circuit always consists of an equivalent ac voltage source and an equivalent
1) - Capacitive reactance
2) - Inductive reactance
3) + Series impedance
4) - Parallel impedance

26) When can the superposition theorem be applied in multi-source circuits?
1) - When frequencies are different

2) + When frequencies are the same
3) - Only in DC circuits
4) - When all sources are pure resistances

27) A Norton ac equivalent circuit always consists of an equivalent
1) - ac current source in series with an equivalent impedance
2) - ac current source in parallel with an equivalent reactance
3) + ac current source in parallel with an equivalent impedance
4) - ac voltage source in parallel with an equivalent impedance

28) To maximize coupling between two coils, they are:
1) - Reduced in turns for the second coil
2) - Supplied with lower AC frequency
3) + Wound on a common core
4) - Spaced farther apart

29) A transformer is used for
1) - dc voltages
2) + ac voltages
3) - both dc and ac

30) **In the isolated transformers**

a) $V_{Pri} > V_{Sec}$
b) $V_{Pri} < V_{Sec}$
c) $V_{Pri} = V_{Sec}$
d) $V_{Pri} \leq V_{Sec}$

1) - a
2) - b
3) + c
4) - d

31) If the primary winding = 100 turns & secondary winding = 400 turns, then the turn ratio (n) equals
1) - 1/4
2) - 200
3) - 400
4) + 4

32) The primary winding of a transformer has 120 V AC across it. What is the secondary voltage if the turns ratio is 5?
1) - 24
2) + 600
3) - 60
4) - 240

33) If the voltage on the primary winding of the transformer is 10 V DC, then the voltage of the secondary winding is:
1) - 10 V
2) + 0 V
3) - Depends on the turn's ratio
4) - More than 10 V

34) If 10 W of power are applied to the primary of an ideal transformer with a turn's ratio of 5, the power delivered to the secondary load is
1) - 50 W
2) - 0.5 W

3) - 0 W
4) + 10 W

35) When a three-phase generator is used instead of a single-phase generator, the required copper wire size:
1) - Increases
2) + Decreases
3) - Remains constant
4) - Depends on frequency

36) Which of the following applications benefits most from constant load power?
1) - Solar power systems
2) + Heavy induction motors
3) - Precision electronic circuits
4) - Fluorescent lamps

37) In a three-phase system, the voltages are separated by
1) - 90°
2) - 30°
3) - 180°
4) + 120°

38) The phase current produced by a certain 240 V, Y-connected generator is 12 A. The corresponding line current is
1) - 36 A
2) - 4.0 A
3) + 12 A
4) - 6.0 A

39) A certain Δ-connected generator produces phase voltages of 30 V. The magnitude of the line voltages is
1) - 10 V
2) + 30 V
3) - 90 V
4) - none of these

40) **To decrease the phase angle below 45°, the following condition must exist:**
a) $R = XC$
b) $R < X_C$
c) $R > X_C$
d) $R = 10X_C$

1) - a
2) - b
3) + c
4) - d

41) **To what value must the rheostat be set in Figure (1) to make the total current 10 mA?**

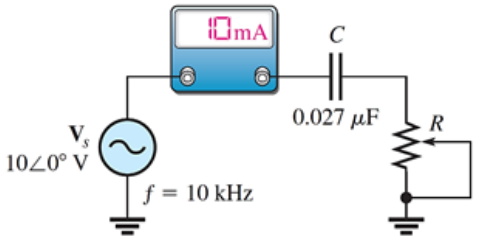

Figure (1)

1) - 1 kΩ

2) + 807.8 Ω
3) - 500 Ω
4) - 900 Ω

42) **Determine θ for the circuit in Figure (2):**

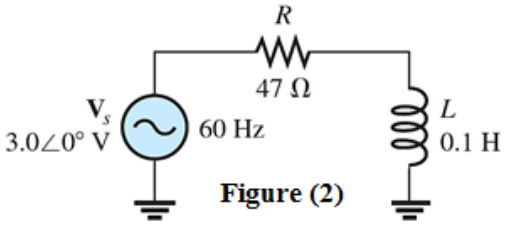

Figure (2)

1) - 51.3°
2) - 45°
3) - 83.7°
4) + 38.7°

43) **Find the resonant frequency in Figure (3):**

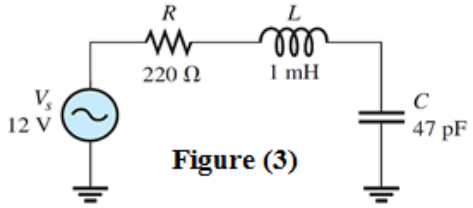

Figure (3)

1) + 734.1 KHz
2) - 734.1 Hz
3) - 23.2 KHz
4) - 23.2 Hz

44) **For the circuit in Figure (4), find the total currents in polar form.**

a) $I_{tot} = 18 \angle 37.1°$ mA
b) $I_{tot} = 184 \angle 70°$ mA
c) $I_{tot} = 184 \angle 37.1°$ mA
d) $I_{tot} = 1.8 \angle 37.1°$ mA

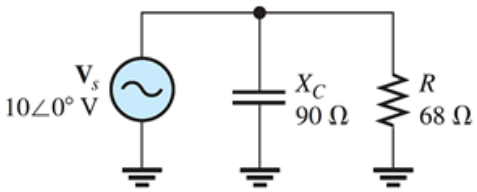

Figure (4)

1) - a
2) - b
3) + c
4) - d

45)

Find the impedance in Figure (5), and express it in polar form.

a) $65 \angle 43.8° \ \Omega$
b) $162 \angle 43.8° \ \Omega$
c) $65 \angle 46.3° \ \Omega$
d) $9.6 \angle 43.8° \ \Omega$

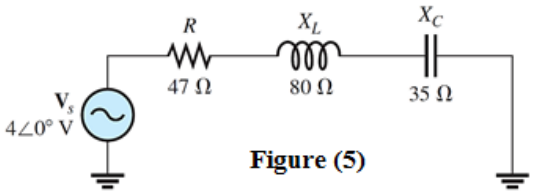

Figure (5)

1) + a
2) - b
3) - c
4) - d