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FCC Element 3 - General Radiotelephone

1. The product of the readings of an AC voltmeter and AC ammeter is called:

- **Apparent power.**
- True power.
- Power factor.
- Current power.

Note:

The product of AC voltmeter and ammeter readings represents apparent power, measured in volt-amperes (VA). True power includes a power factor term, power factor is a ratio, and 'current power' is not a recognized term.

2. What is the basic unit of electrical power?

- Ohm.
- **Watt.**
- Volt.
- Ampere.

Note:

Electrical power is measured in watts, representing the rate of energy use. A watt is defined as the rate at which electrical energy is converted or used per unit of time, and is calculated as voltage multiplied by current. Ohms measure resistance, volts measure electric potential, and amperes measure electric current; these are not units of power.

3. What is the term used to express the amount of electrical energy stored in an electrostatic field?

- **Joules.**
- Coulombs.
- Watts.
- Volts.

Note:

Electrical energy is measured in joules. Joules represent energy, while coulombs measure charge, watts measure power, and volts measure electric potential. Therefore, the correct answer is joules.

4. What device is used to store electrical energy in an electrostatic field?

- Battery.
- Transformer.
- **Capacitor.**
- Inductor.

Note:

A capacitor stores electrical energy in an electrostatic field between its plates, unlike batteries which store chemical energy, transformers which transfer energy via magnetic fields, and inductors which store energy in magnetic fields.

5. What formula would determine the inductive reactance of a coil if frequency and coil inductance are known?

- $X_L = \pi f L$
- **$X_L = 2\pi f L$**
- $X_L = 1 / 2\pi f C$
- $X_L = 1 / R^2 + X^2$

Note:

Inductive reactance is determined by the formula $X_L = 2\pi f L$, which relates reactance to frequency and inductance.

6. What is the term for the out-of-phase power associated with inductors and capacitors?

- Effective power.
- True power.
- Peak envelope power.
- **Reactive power.**

Note:

Reactive power is the component of AC power that is out of phase with voltage in circuits containing inductors and capacitors, and does not perform useful work; this distinguishes it from true power, which represents actual work, and eliminates the other options.

7. What determines the strength of the magnetic field around a conductor?

- The resistance divided by the current.
- The ratio of the current to the resistance.
- The diameter of the conductor.
- **The amount of current.**

Note:

The magnetic field strength around a conductor is directly proportional to the current flowing through it.

8. What will produce a magnetic field?

- A DC source not connected to a circuit.
- The presence of a voltage across a capacitor.
- **A current flowing through a conductor .**
- The force that drives current through a resistor.

Note:

A magnetic field is generated by moving electric charges, which constitutes electric current. Therefore, current flowing through a conductor produces a magnetic field.

9. When induced currents produce expanding magnetic fields around conductors in a direction that opposes the original magnetic field, this is known as:

- **Lenz's law.**
- Gilbert's law.
- Maxwell's law.
- Norton's law.

Note:

Lenz's law dictates that induced currents generate magnetic fields opposing the change in the original magnetic field. This principle reflects conservation of energy and modifies Faraday's law to specify the direction of induced current, distinguishing it from Maxwell's equations, Norton's theorem, and Gilbert's work, which address different electromagnetic or circuit concepts.

10. The opposition to the creation of magnetic lines of force in a magnetic circuit is known as:

- Eddy currents.
- Hysteresis.
- Permeability.
- **Reluctance**.

Note:

Reluctance opposes the establishment of magnetic flux in a magnetic circuit, analogous to electrical resistance. Permeability indicates ease of magnetization, hysteresis describes lag and loss, and eddy currents are induced currents causing loss; therefore, reluctance is the correct answer.
