A-003-001-005 **(B)**

In applying Ohm's law to AC circuits, current and voltage values are:

A none of the proposed answers
B peak values times 0.707
C average values
D average values times 1.414

A-003-001-006 **(C)**

The effective value of a sine wave of voltage or current is:

A 100% of the maximum value
B 63.6% of the maximum value
C 70.7% of the maximum value
D 50% of the maximum value

A-003-001-007 **(D)**

AC voltmeter scales are usually calibrated to read:

A peak voltage
B instantaneous voltage
C average voltage
D RMS voltage

A-003-001-008 **(B)**

An AC voltmeter is calibrated to read the:

A peak value
B effective value
C peak-to-peak value
D average value

A-003-001-009 **(C)**

Which AC voltage value will produce the same amount of heat as a DC voltage, when applied to the same resistance?

A The peak value
B The peak-to-peak value
C The RMS value
D The average value

A-003-001-010 **(B)**

What is the peak-to-peak voltage of a sine wave that has an RMS voltage of 120 volts?

A 204.8 volts
B 339.5 volts
C 84.8 volts
D 169.7 volts

A-003-001-011 **(A)**

A sine wave of 17 volts peak is equivalent to how many volts RMS?

A 12 volts
B 24 volts
C 34 volts
D 8.5 volts

A-003-002-001 **(C)**

The power supplied to the antenna transmission line by a transmitter during an RF cycle at the highest crest of the modulation envelope is known as:

A carrier power
B full power
C peak-envelope power
D mean power

A-003-002-002 **(C)**

To compute one of the following, multiply the peak-envelope voltage by 0.707 to obtain the RMS value, square the result and divide by the load resistance. Which is the correct answer?

A ERP
B power factor
C PEP
D PIV

A-003-002-003 **(C)**

Peak-Envelope Power (PEP) for SSB transmission is:

A equal to the RMS power
B a hypothetical measurement
C Peak-Envelope Voltage (PEV) multiplied by 0.707, squared and divided by the load resistance
D peak-voltage multiplied by peak current

A-003-002-004 **(C)**

The formula to be used to calculate the power output of a transmitter into a resistor load using a voltmeter is:

A P = EI cos 0
B P = IR
C P = (E exponent 2) /R
D P = EI/R

A-003-002-005 **(A)**

How is the output Peak-Envelope Power of a transmitter calculated if an oscilloscope is used to measure the Peak-Envelope Voltage across a dummy resistive load (where PEP = Peak-Envelope Power, PEV = Peak-Envelope Voltage, Vp = peak-voltage, RL = load resistance)?

A PEP = [(0.707 PEV)(0.707 PEV)] / RL
B PEP = [(Vp)(Vp)] / (RL)
C PEP = (Vp)(Vp)(RL)
D PEP = [(1.414 PEV)(1.414 PEV)] / RL

A-003-002-006 **(A)**

What is the output PEP from a transmitter if an oscilloscope measures 200 volts peak-to-peak across a 50-ohm dummy load connected to the transmitter output?

A 100 watts
B 400 watts
C 1000 watts
D 200 watts

A-003-002-007 **(B)**

What is the output PEP from a transmitter if an oscilloscope measures 500 volts peak-to-peak across a 50-ohm dummy load connected to the transmitter output?

A 500 watts
B 625 watts
C 1250 watts
D 2500 watts

A-003-002-008 **(B)**

What is the output PEP of an unmodulated carrier transmitter if a wattmeter connected to the transmitter output indicates an average reading of 1060 watts?

A 530 watts
B 1060 watts
C 2120 watts
D 1500 watts

A-003-002-009 **(A)**

What is the output PEP from a transmitter, if an oscilloscope measures 400 volts peak-to-peak across a 50 ohm dummy load connected to the transmitter output?

A 400 watts
B 200 watts
C 600 watts
D 1000 watts

A-003-002-010 **(B)**

What is the output PEP from a transmitter, if an oscilloscope measures 800 volts peak-to-peak across a 50 ohm dummy load connected to the transmitter output?

A 3200 watts
B 1600 watts
C 800 watts
D 6400 watts

A-003-002-011 **(D)**

An oscilloscope measures 500 volts peak-to-peak across a 50 ohm dummy load connected to the transmitter output during unmodulated carrier conditions. What would an average-reading power meter indicate under the same transmitter conditions?

A 427.5 watts
B 884 watts
C 442 watts
D 625 watts

A-003-003-001 **(C)**

What is a dip meter?

A A marker generator
B A field-strength meter
C A variable frequency oscillator with metered feedback current
D An SWR meter

A-003-003-002 **(D)**

What does a dip meter do?

A It measures transmitter output power accurately
B It measures field strength accurately
C It measures frequency accurately
D It gives an indication of the resonant frequency of a circuit

A-003-003-003 **(A)**

What two ways could a dip meter be used in an amateur station?

A To measure resonant frequencies of antenna traps and to measure a tuned circuit resonant frequency
B To measure antenna resonance and impedance
C To measure antenna resonance and percentage modulation
D To measure resonant frequency of antenna traps and percentage modulation

A-003-003-004 **(B)**

A dip meter supplies the radio frequency energy which enables you to check:

A the adjustment of an inductor
B the resonant frequency of a circuit
C the calibration of an absorption-type wavemeter
D the impedance mismatch in a circuit

A-003-003-005 **(A)**

A dip meter may not be used directly to:

A measure the value of capacitance or inductance
B align transmitter-tuned circuits
C determine the frequency of oscillations
D align receiver-tuned circuits

A-003-003-006 **(B)**

The dial calibration on the output attenuator of a signal generator:

A reads half the true output when the attenuator is properly terminated
B reads accurately only when the attenuator is properly terminated
C always reads the true output of the signal generator
D reads twice the true output when the attenuator is properly terminated

A-003-003-007 **(B)**

What is a signal generator?

A A high-stability oscillator which generates reference signals at exact frequency intervals
B A high-stability oscillator which can produce a wide range of frequencies and amplitudes
C A low-stability oscillator which sweeps through a range of frequencies
D A low-stability oscillator used to inject a signal into a circuit under test

A-003-003-008 **(D)**

A dip meter:

A should be tightly coupled to the circuit under test
B may be used only with series tuned circuits
C accurately measures frequencies
D should be loosely coupled to the circuit under test

A-003-003-009 **(D)**

Which two instruments are needed to measure FM receiver sensitivity for a 12 dB SINAD ratio (signal + noise + distortion over noise + distortion)?

A RF signal generator with FM tone modulation and a deviation meter
B Oscilloscope and spectrum analyzer
C Receiver noise bridge and total harmonic distortion analyser
D Calibrated RF signal generator with FM tone modulation and total harmonic distortion (THD) analyzer

A-003-003-010 **(B)**

The dip meter is most directly applicable to:

A series tuned circuits
B parallel tuned circuits
C operational amplifier circuits
D digital logic circuits

A-003-003-011 **(A)**

Which of the following is not a factor affecting the frequency accuracy of a dip meter?

A Transmitter power output
B Hand capacity
C Stray capacity
D Over coupling

A-003-004-001 **(C)**

What does a frequency counter do?

A It generates broad-band white noise for calibration
B It produces a reference frequency
C It makes frequency measurements
D It measures frequency deviation

A-003-004-002 **(C)**

What factors limit the accuracy, frequency response and stability of a frequency counter?

A Number of digits in the readout, speed of the logic, and time base stability
B Number of digits in the readout, external frequency reference and temperature coefficient of the logic
C Time base accuracy, speed of the logic, and time base stability
D Time base accuracy, temperature coefficient of the logic and time base stability

A-003-004-003 **(A)**

How can the accuracy of a frequency counter be improved?

A By increasing the accuracy of the time base
B By using slower digital logic
C By using faster digital logic
D By improving the accuracy of the frequency response

A-003-004-004 **(A)**

If a frequency counter with a time base accuracy of +/- 0.1 PPM (parts per million) reads 146 520 000 Hz, what is the most that the actual frequency being measured could differ from that reading?

A 14.652 Hz
B 0.1 MHz
C 1.4652 Hz
D 1.4652 kHz

A-003-004-005 **(B)**

If a frequency counter, with a time base accuracy of 10 PPM (parts per million) reads 146 520 000 Hz, what is the most the actual frequency being measured could differ from that reading?

A 1465.2 kHz
B 1465.2 Hz
C 146.52 Hz
D 146.52 kHz

A-003-004-006 **(C)**

The clock in a frequency counter normally uses a:

A mechanical tuning fork
B free-running multivibrator
C crystal oscillator
D self-oscillating Hartley oscillator

A-003-004-007 **(A)**

The frequency accuracy of a frequency counter is determined by:

A the characteristics of the internal time-base generator
B the size of the frequency counter
C type of display used in the counter
D the number of digits displayed

A-003-004-008 **(B)**

Which device relies on a stable low-frequency oscillator, with harmonic output, to facilitate the frequency calibration of receiver dial settings?

A Frequency counter
B Frequency-marker generator
C Signal generator
D Harmonic calibrator

A-003-004-009 **(D)**

What is the traditional way of verifying the accuracy of a crystal calibrator?

A Compare the oscillator with your transmitter
B Use a dip-meter to determine the oscillator's fundamental frequency
C Compare the oscillator with your receiver
D Zero-beat the crystal oscillator against a standard frequency station such as WWV

A-003-004-010 **(D)**

Out of the following oscillators, one is NOT, by itself, considered a high-stability reference:

A temperature compensated crystal oscillator (TCXO)
B oven-controlled crystal oscillator (OCXO)
C GPS disciplined oscillator (GPSDO)
D voltage-controlled crystal oscillator (VCXO)

A-003-004-011 **(A)**

You want to calibrate your station frequency reference to the WWV signal on your receiver. The resulting beat tone must be:

A of a frequency as low as possible and with a period as long as possible
B a combined frequency above both
C the mathematical mean of both frequencies
D at the highest audio frequency possible

A-003-005-001 **(C)**

If a 100 Hz signal is fed to the horizontal input of an oscilloscope and a 150 Hz signal is fed to the vertical input, what type of pattern should be displayed on the screen?

A An oval pattern 100 mm wide and 150 mm high
B A looping pattern with 100 horizontal loops and 150 vertical loops
C A looping pattern with 3 horizontal loops, and 2 vertical loops
D A rectangular pattern 100 mm wide and 150 mm high

A-003-005-002 **(B)**

What factors limit the accuracy, frequency response and stability of an oscilloscope?

A Tube face voltage increments and deflection amplifier voltages
B Accuracy of the time base and the linearity and bandwidth of the deflection amplifiers
C Deflection amplifier output impedance and tube face frequency increments
D Accuracy and linearity of the time base and tube face voltage increments

A-003-005-003 **(D)**

How can the frequency response of an oscilloscope be improved?

A By using a crystal oscillator as the time base and increasing the vertical sweep rate
B By increasing the vertical sweep rate and the horizontal amplifier frequency response
C By using triggered sweep and a crystal oscillator for the timebase
D By increasing the horizontal sweep rate and the vertical amplifier frequency response

A-003-005-004 **(D)**

You can use an oscilloscope to display the input and output of a circuit at the same time by:

A measuring the input on the X axis and the output on the Y axis
B measuring the input on the X axis and the output on the Z axis
C measuring the input on the Y axis and the output on the X axis
D utilizing a dual trace oscilloscope

A-003-005-005 **(D)**

An oscilloscope cannot be used to:

A measure frequency
B measure DC voltage
C determine the amplitude of complex voltage wave forms
D determine FM carrier deviation directly

A-003-005-006 **(D)**

The bandwidth of an oscilloscope is:

A directly related to gain compression
B indirectly related to screen persistence
C a function of the time-base accuracy
D the highest frequency signal the scope can display

A-003-005-007 **(B)**

When using Lissajous figures to determine phase differences, an indication of zero or 180 degrees is represented on the screen of an oscilloscope by:

A a circle
B a diagonal straight line
C a horizontal straight line
D an ellipse

A-003-005-008 **(D)**

A 100-kHz signal is applied to the horizontal channel of an oscilloscope. A signal of unknown frequency is applied to the vertical channel. The resultant wave form has 5 loops displayed vertically and 2 loops horizontally. The unknown frequency is:

A 20 kHz
B 50 kHz
C 30 kHz
D 40 kHz

A-003-005-009 **(A)**

An oscilloscope probe must be compensated:

A every time the probe is used with a different oscilloscope
B when measuring a sine wave
C through the addition of a high-value series resistor
D when measuring a signal whose frequency varies

A-003-005-010 **(D)**

What is the best instrument to use to check the signal quality of a CW or single-sideband phone transmitter?

A A sidetone monitor
B A signal tracer and an audio amplifier
C A field-strength meter
D An oscilloscope

A-003-005-011 **(A)**

What is the best signal source to connect to the vertical input of an oscilloscope for checking the quality of a transmitted signal?

A The RF output of the transmitter through a sampling device
B The RF signals of a nearby receiving antenna
C The IF output of a monitoring receiver
D The audio input of the transmitter

A-003-006-001 **(D)**

A meter has a full-scale deflection of 40 microamperes and an internal resistance of 96 ohms. You want it to read 0 to 1 mA. The value of the shunt to be used is:

A 24 ohms
B 16 ohms
C 40 ohms
D 4 ohms

A-003-006-002 **(B)**

A moving-coil milliammeter having a full-scale deflection of 1 mA and an internal resistance of 0.5 ohms is to be converted to a voltmeter of 20 volts full-scale deflection. It would be necessary to insert a:

A shunt resistance of 19.5 ohms
B series resistance of 19 999.5 ohms
C series resistance of 1 999.5 ohms
D shunt resistance of 19 999.5 ohms

A-003-006-003 **(D)**

A voltmeter having a range of 150 volts and an internal resistance of 150 000 ohms is to be extended to read 750 volts. The required multiplier resistor would have a value of:

A 1 500 ohms
B 750 000 ohms
C 1 200 000 ohms
D 600 000 ohms

A-003-006-004 **(A)**

The sensitivity of an ammeter is an expression of:

A the amount of current causing full-scale deflection
B the resistance of the meter
C the loading effect the meter will have on a circuit
D the value of the shunt resistor

A-003-006-005 **(D)**

Voltmeter sensitivity is usually expressed in ohms per volt. This means that a voltmeter with a sensitivity of 20 kilohms per volt would be a:

A 1 milliampere meter
B 50 milliampere meter
C 100 milliampere meter
D 50 microampere meter

A-003-006-006 **(D)**

The sensitivity of a voltmeter, whose resistance is 150 000 ohms on the 150-volt range, is:

A 100 000 ohms per volt
B 10 000 ohms per volt
C 150 ohms per volt
D 1000 ohms per volt

A-003-006-007 **(C)**

The range of a DC ammeter can easily be extended by:

A changing the internal inductance of the meter
B changing the internal capacitance of the meter to resonance
C connecting an external resistance in parallel with the internal resistance
D connecting an external resistance in series with the internal resistance

A-003-006-008 **(C)**

What happens inside a multimeter when you switch it from a lower to a higher voltage range?

A Resistance is reduced in parallel with the meter
B Resistance is added in parallel with the meter
C Resistance is added in series with the meter
D Resistance is reduced in series with the meter

A-003-006-009 **(D)**

How can the range of an ammeter be increased?

A By adding resistance in series with the circuit under test
B By adding resistance in parallel with the circuit under test
C By adding resistance in series with the meter
D By adding resistance in parallel with the meter

A-003-006-010 **(B)**

Where should an RF wattmeter be connected for the most accurate readings of transmitter output power?

A At the antenna feed point
B At the transmitter output connector
C One-half wavelength from the transmitter output
D One-half wavelength from the antenna feed point

A-003-006-011 **(C)**

At what line impedance do most RF wattmeters usually operate?

A 100 ohms
B 300 ohms
C 50 ohms
D 25 ohms

A-004-001-001 **(D)**

For the same transformer secondary voltage, which rectifier has the highest average output voltage?

A Half-wave
B Quarter-wave
C Full-wave centre-tap
D Bridge

A-004-001-002 **(A)**

In a half-wave power supply with a capacitor input filter and a load drawing little or no current, the peak inverse voltage (PIV) across the diode can reach _____ times the RMS voltage.

A 2.8
B 0.45
C 5.6
D 1.4