# Results for sample extra2016 test paper

Your answers are marked like this:

✔ **A. You got this question right, this is your correct answer.**

x *A. You got this question wrong, this is your incorrect answer.*

✔ *A. You got this question wrong, this is the correct answer.*

✔ **A. You didnt answer this question but this would be the correct answer.**

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## Subelement E0

*1: E0A02*
**When evaluating RF exposure levels from your station at a neighbor's home, what must you do?**
A. Make sure signals from your station are less than the controlled MPE limits
✔ **B. Make sure signals from your station are less than the uncontrolled MPE limits**
C. You need only evaluate exposure levels on your own property
D. Advise your neighbors of the results of your tests

## Subelement E1

*2: E1A02*
**When using a transceiver that displays the carrier frequency of phone signals, which of the following displayed frequencies represents the lowest frequency at which a properly adjusted LSB emission will be totally within the band?**
A. The exact lower band edge
B. 300 Hz above the lower band edge
C. 1 kHz above the lower band edge
✔ **D. 3 kHz above the lower band edge**

*3: E1B04*
**What must be done before placing an amateur station within an officially designated wilderness area or wildlife preserve, or an area listed in the National Register of Historical Places?**
A. A proposal must be submitted to the National Park Service
B. A letter of intent must be filed with the National Audubon Society
✔ **C. An Environmental Assessment must be submitted to the FCC**

D. A form FSD-15 must be submitted to the Department of the Interior

*4: E1C11*

**Which of the following operating arrangements allows an FCC-licensed U.S. citizen to operate in many European countries, and alien amateurs from many European countries to operate in the U.S.?**

✔ **A. CEPT agreement**

B. IARP agreement

C. ITU reciprocal license

D. All of these choices are correct

*5: E1D01*

**What is the definition of the term telemetry?**

✔ **A. One-way transmission of measurements at a distance from the measuring instrument**

B. Two-way radiotelephone transmissions in excess of 1000 feet

C. Two-way single channel transmissions of data

D. One-way transmission that initiates, modifies, or terminates the functions of a device at a distance

*6: E1E09*

**What may be the penalty for a VE who fraudulently administers or certifies an examination?**

✔ **A. Revocation of the VE's amateur station license grant and the suspension of the VE's amateur operator license grant**

B. A fine of up to $1000 per occurrence

C. A sentence of up to one year in prison

D. All of these choices are correct

*7: E1F06*

**Under what circumstances might the FCC issue a Special Temporary Authority (STA) to an amateur station?**

✔ **A. To provide for experimental amateur communications**

B. To allow regular operation on Land Mobile channels

C. To provide additional spectrum for personal use

xD. To provide temporary operation while awaiting normal licensing

## Subelement E2

*8: E2A14*

**What technology is used to track, in real time, balloons carrying amateur radio transmitters?**

A. Radar

B. Bandwidth compressed LORAN

✔ **C. APRS**

D. Doppler shift of beacon signals

*9: E2B14*

**What aspect of an amateur slow-scan television signal encodes the brightness of the picture?**

✔ **A. Tone frequency**

B. Tone amplitude

C. Sync amplitude

D. Sync frequency

*10: E2C04*

**What type of transmission is most often used for a ham radio mesh network?**

✔ **A. Spread spectrum in the 2.4 GHz band**

B. Multiple Frequency Shift Keying in the 10 GHz band

C. Store and forward on the 440 MHz band

D. Frequency division multiplex in the 24 GHz band

*11: E2D14*

**What is one advantage of using JT65 coding?**

A. Uses only a 65 Hz bandwidth

✔ **B. The ability to decode signals which have a very low signal to noise ratio**

C. Easily copied by ear if necessary

D. Permits fast-scan TV transmissions over narrow bandwidth

*12: E2E02*

**What do the letters FEC mean as they relate to digital operation?**

✔ **A. Forward Error Correction**

B. First Error Correction

C. Fatal Error Correction

D. Final Error Correction

## Subelement E3

*13: E3A09*

**Which of the following frequency range is most suited for meteor scatter communications?**

A. 1.8 MHz - 1.9 MHz

B. 10 MHz - 14 MHz

✔ **C. 28 MHz - 148 MHz**

D. 220 MHz - 450 MHz

*14: E3B11*

**At what time of day is Sporadic-E propagation most likely to occur?**

A. Around sunset

B. Around sunrise

C. Early evening

✔ **D. Any time**

*15: E3C12*

**How does the maximum distance of ground-wave propagation change when the signal frequency is increased?**

A. It stays the same
B. It increases
✔ **C. It decreases**
D. It peaks at roughly 14 MHz

# Subelement E4

*16: E4A15*

**What is an advantage of a period-measuring frequency counter over a direct-count type?**

A. It can run on battery power for remote measurements
B. It does not require an expensive high-precision time base
✔ **C. It provides improved resolution of low-frequency signals within a comparable time period**
D. It can directly measure the modulation index of an FM transmitter

*17: E4B11*

**How should an antenna analyzer be connected when measuring antenna resonance and feed point impedance?**

A. Loosely couple the analyzer near the antenna base
B. Connect the analyzer via a high-impedance transformer to the antenna
C. Loosely couple the antenna and a dummy load to the analyzer
✔ **D. Connect the antenna feed line directly to the analyzer's connector**

*18: E4C17*

**Which of the following has the largest effect on an SDR receiver's linearity?**

A. CPU register width in bits
B. Anti-aliasing input filter bandwidth
C. RAM speed used for data storage
✔ **D. Analog-to-digital converter sample width in bits**

*19: E4D05*

**What transmitter frequencies would cause an intermodulation-product signal in a receiver tuned to 146.70 MHz when a nearby station transmits on 146.52 MHz?**

✔ **A. 146.34 MHz and 146.61 MHz**
B. 146.88 MHz and 146.34 MHz
C. 146.10 MHz and 147.30 MHz
D. 173.35 MHz and 139.40 MHz

*20: E4E10*

**What is a common characteristic of interference caused by a touch controlled electrical device?**

A. The interfering signal sounds like AC hum on an AM receiver or a carrier modulated by 60 Hz hum on a SSB or CW receiver

B. The interfering signal may drift slowly across the HF spectrum

xC. The interfering signal can be several kHz in width and usually repeats at regular intervals across a HF band

✔ **D. All of these choices are correct**

# Subelement E5

*21: E5A03*

**What is the magnitude of the impedance of a series RLC circuit at resonance?**

A. High, as compared to the circuit resistance

B. Approximately equal to capacitive reactance

C. Approximately equal to inductive reactance

✔ **D. Approximately equal to circuit resistance**

*22: E5B12*

**What is admittance?**

✔ **A. The inverse of impedance**

B. The term for the gain of a field effect transistor

C. The turns ratio of a transformer

D. The unit used for Q factor

*23: E5C16*

**Which point on Figure E5-2 best represents the impedance of a series circuit consisting of a 300 ohm resistor and a 19 picofarad capacitor at 21.200 MHz?**

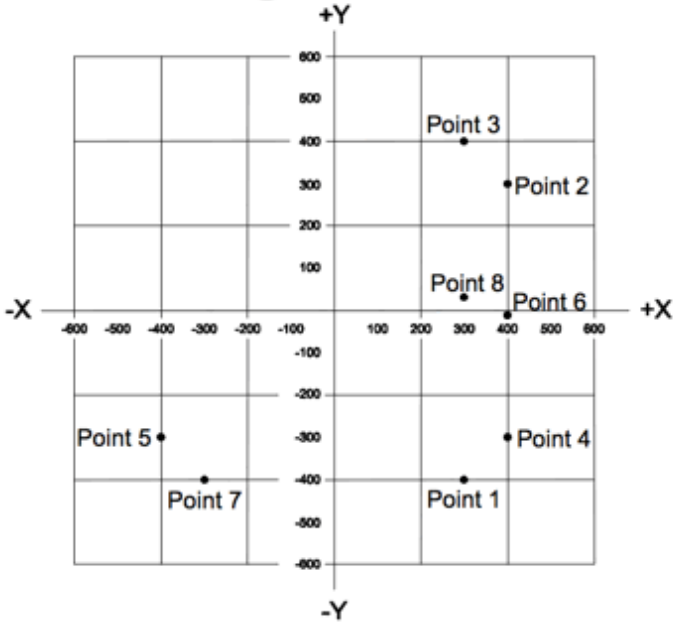
✔ **A. Point 1**

B. Point 3

C. Point 7

D. Point 8

**Figure E5-2**




*24: E5D13*

**How much power is consumed in a circuit consisting of a 100 ohm resistor in series with a 100 ohm inductive reactance drawing 1 ampere?**

A. 70.7 Watts

✔ **B. 100 Watts**

C. 141.4 Watts

D. 200 Watts

## Subelement E6

*25: E6A14*

**How does DC input impedance at the gate of a field-effect transistor compare with the DC input impedance of a bipolar transistor?**

A. They are both low impedance

B. An FET has low input impedance; a bipolar transistor has high input impedance

✔ **C. An FET has high input impedance; a bipolar transistor has low input impedance**

D. They are both high impedance

*26: E6B05*

**What characteristic of a PIN diode makes it useful as an RF switch or attenuator?**

A. Extremely high reverse breakdown voltage

B. Ability to dissipate large amounts of power

C. Reverse bias controls its forward voltage drop

✔ **D. A large region of intrinsic material**

*27: E6C04*

**What is the primary advantage of tri-state logic?**

A. Low power consumption

✔ **B. Ability to connect many device outputs to a common bus**

xC. High speed operation

D. More efficient arithmetic operations

*28: E6D02*

**What is the equivalent circuit of a quartz crystal?**

✔ **A. Motional capacitance, motional inductance, and loss resistance in series, all in parallel with a shunt capacitor representing electrode and stray capacitance**

B. Motional capacitance, motional inductance, loss resistance, and a capacitor representing electrode and stray capacitance all in parallel

C. Motional capacitance, motional inductance, loss resistance, and a capacitor representing electrode and stray capacitance all in series

D. Motional inductance and loss resistance in series, paralleled with motional capacitance and a capacitor representing electrode and stray capacitance

*29: E6E09*

**Which of the following component package types would be most suitable for use at frequencies above the HF range?**

A. TO-220

B. Axial lead

C. Radial lead

✔ **D. Surface mount**

*30: E6F12*

**What absorbs the energy from light falling on a photovoltaic cell?**

A. Protons

B. Photons

✔ **C. Electrons**

D. Holes

## Subelement E7

*31: E7A04*

**How many flip-flops are required to divide a signal frequency by 4?**

A. 1

✔ **B. 2**

C. 4

D. 8

*32: E7B02*

**What is a Class D amplifier?**

✔ **A. A type of amplifier that uses switching technology to achieve high efficiency**

B. A low power amplifier that uses a differential amplifier for improved linearity

C. An amplifier that uses drift-mode FETs for high efficiency

D. A frequency doubling amplifier

*33: E7C15*

**What is a crystal lattice filter?**

A. A power supply filter made with interlaced quartz crystals
B. An audio filter made with four quartz crystals that resonate at 1kHz intervals
C. A filter with wide bandwidth and shallow skirts made using quartz crystals
✔ **D. A filter with narrow bandwidth and steep skirts made using quartz crystals**

*34: E7D04*
**Which of the following types of linear voltage regulator usually make the most efficient use of the primary power source?**
A. A series current source
✔ **B. A series regulator**
C. A shunt regulator
D. A shunt current source

*35: E7E06*
**Why is de-emphasis commonly used in FM communications receivers?**
✔ **A. For compatibility with transmitters using phase modulation**
B. To reduce impulse noise reception
C. For higher efficiency
D. To remove third-order distortion products

*36: E7F11*
**What sets the minimum detectable signal level for an SDR in the absence of atmospheric or thermal noise?**
A. Sample clock phase noise
✔ **B. Reference voltage level and sample width in bits**
C. Data storage transfer rate
D. Missing codes and jitter

*37: E7G02*
**What is the effect of ringing in a filter?**
A. An echo caused by a long time delay
B. A reduction in high frequency response
C. Partial cancellation of the signal over a range of frequencies
✔ **D. Undesired oscillations added to the desired signal**

*38: E7H10*
**What information is contained in the lookup table of a direct digital frequency synthesizer?**
A. The phase relationship between a reference oscillator and the output waveform
✔ **B. The amplitude values that represent a sine-wave output**
C. The phase relationship between a voltage-controlled oscillator and the output waveform
D. The synthesizer frequency limits and frequency values stored in the radio memories

## Subelement E8

*39: E8A13*

**Which of these methods is commonly used to convert analog signals to digital signals?**

✔ **A. Sequential sampling**

B. Harmonic regeneration

C. Level shifting

D. Phase reversal

*40: E8B11*

**What is digital time division multiplexing?**

A. Two or more data streams are assigned to discrete sub-carriers on an FM transmitter

✔ **B. Two or more signals are arranged to share discrete time slots of a data transmission**

C. Two or more data streams share the same channel by transmitting time of transmission as the sub-carrier

D. Two or more signals are quadrature modulated to increase bandwidth efficiency

*41: E8C08*

**How does ARQ accomplish error correction?**

A. Special binary codes provide automatic correction

B. Special polynomial codes provide automatic correction

C. If errors are detected, redundant data is substituted

✔ **D. If errors are detected, a retransmission is requested**

*42: E8D01*

**Why are received spread spectrum signals resistant to interference?**

✔ **A. Signals not using the spread spectrum algorithm are suppressed in the receiver**

B. The high power used by a spread spectrum transmitter keeps its signal from being easily overpowered

C. The receiver is always equipped with a digital blanker

D. If interference is detected by the receiver it will signal the transmitter to change frequencies

## Subelement E9

*43: E9A06*

**How does the beamwidth of an antenna vary as the gain is increased?**

A. It increases geometrically

B. It increases arithmetically

C. It is essentially unaffected

✔ **D. It decreases**

*44: E9B07*

**How does the total amount of radiation emitted by a directional gain antenna compare with the total amount of radiation emitted from an isotropic antenna, assuming each is driven by the same amount of power?**

A. The total amount of radiation from the directional antenna is increased by the gain of the antenna

B. The total amount of radiation from the directional antenna is stronger by its front-to-back ratio

✔ **C. They are the same**

D. The radiation from the isotropic antenna is 2.15 dB stronger than that from the directional antenna

*45: E9C11*

**How is the far-field elevation pattern of a vertically polarized antenna affected by being mounted over seawater versus rocky ground?**

A. The low-angle radiation decreases

B. The high-angle radiation increases

C. Both the high-angle and low-angle radiation decrease

✔ **D. The low-angle radiation increases**

*46: E9D09*

**What is the function of a loading coil used as part of an HF mobile antenna?**

A. To increase the SWR bandwidth

B. To lower the losses

C. To lower the Q

✔ **D. To cancel capacitive reactance**

*47: E9E10*

**Which of these choices is an effective way to match an antenna with a 100 ohm feed point impedance to a 50 ohm coaxial cable feed line?**

A. Connect a 1/4-wavelength open stub of 300 ohm twin-lead in parallel with the coaxial feed line where it connects to the antenna

B. Insert a 1/2 wavelength piece of 300 ohm twin-lead in series between the antenna terminals and the 50 ohm feed cable

✔ **C. Insert a 1/4-wavelength piece of 75 ohm coaxial cable transmission line in series between the antenna terminals and the 50 ohm feed cable**

D. Connect 1/2 wavelength shorted stub of 75 ohm cable in parallel with the 50 ohm cable where it attaches to the antenna

*48: E9F10*

**What impedance does a 1/8 wavelength transmission line present to a generator when the line is shorted at the far end?**

A. A capacitive reactance

B. The same as the characteristic impedance of the line

✔ **C. An inductive reactance**

D. The same as the input impedance to the final generator stage

*49: E9G10*

**What do the arcs on a Smith chart represent?**

A. Frequency

B. SWR

C. Points with constant resistance

✔ **D. Points with constant reactance**

*50: E9H07*

**Why is it advisable to use an RF attenuator on a receiver being used for direction finding?**

A. It narrows the bandwidth of the received signal to improve signal to noise ratio

B. It compensates for the effects of an isotropic antenna, thereby improving directivity

C. It reduces loss of received signals caused by antenna pattern nulls, thereby increasing sensitivity

✔ **D. It prevents receiver overload which could make it difficult to determine peaks or nulls**

**Results:**

**You scored 47 correct answers and 3 incorrect answers from a total of 50.**

**You would have passed the exam! Congratulations!**

e)

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