# 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: E0A01*
**What is the primary function of an external earth connection or ground rod?**
A. Reduce received noise
✔ **B. Lightning protection**
C. Reduce RF current flow between pieces of equipment
D. Reduce RFI to telephones and home entertainment systems

## Subelement E1

*2: E1A12*
**With your transceiver displaying the carrier frequency of CW signals, you hear a DX station's CQ on 3.500 MHz. Is it legal to return the call using CW on the same frequency?**
A. Yes, the DX station initiated the contact
B. Yes, the displayed frequency is within the 80 meter CW band segment
✔ **C. No, one of the sidebands of the CW signal will be out of the band**
D. No, U.S. stations are not permitted to use CW emissions below 3.525 MHz

*3: E1B02*
**Which of the following factors might cause the physical location of an amateur station apparatus or antenna structure to be restricted?**
A. The location is near an area of political conflict
B. The location is of geographical or horticultural importance
C. The location is in an ITU Zone designated for coordination with one or more foreign governments
✔ **D. The location is of environmental importance or significant in American history,**

**architecture, or culture**

*4: E1C06*

**Which of the following statements concerning remotely controlled amateur stations is true?**

A. Only Extra Class operators may be the control operator of a remote station
B. A control operator need not be present at the control point
✔ **C. A control operator must be present at the control point**
D. Repeater and auxiliary stations may not be remotely controlled

*5: E1D07*

**Which amateur service HF bands have frequencies authorized for space stations?**

✔ **A. Only the 40 m, 20 m, 17 m, 15 m, 12 m and 10 m bands**
B. Only the 40 m, 20 m, 17 m, 15 m and 10 m bands
C. Only the 40 m, 30 m, 20 m, 15 m, 12 m and 10 m bands
D. All HF bands

*6: E1E13*

**Which of these choices is an acceptable method for monitoring the applicants if a VEC opts to conduct an exam session remotely?**

A. Record the exam session on video tape for later review by the VE team
✔ **B. Use a real-time video link and the Internet to connect the exam session to the observing VEs**
C. The exam proctor observes the applicants and reports any violations
D. Have each applicant sign an affidavit stating that all session rules were followed

*7: E1F12*

**Who may be the control operator of an auxiliary station?**

A. Any licensed amateur operator
✔ **B. Only Technician, General, Advanced or Amateur Extra Class operators**
C. Only General, Advanced or Amateur Extra Class operators
D. Only Amateur Extra Class operators

## Subelement E2

*8: E2A12*

**What is one way to predict the location of a satellite at a given time?**

A. By means of the Doppler data for the specified satellite
B. By subtracting the mean anomaly from the orbital inclination
C. By adding the mean anomaly to the orbital inclination
✔ **D. By calculations using the Keplerian elements for the specified satellite**

*9: E2B05*

**Which of the following is an advantage of using vestigial sideband for standard fast-scan TV transmissions?**

A. The vestigial sideband carries the audio information

B. The vestigial sideband contains chroma information

✔ **C. Vestigial sideband reduces bandwidth while allowing for simple video detector circuitry**

xD. Vestigial sideband provides high frequency emphasis to sharpen the picture

*10: E2C02*

**Which of the following best describes the term self-spotting in regards to HF contest operating?**

✔ **A. The generally prohibited practice of posting one's own call sign and frequency on a spotting network**

B. The acceptable practice of manually posting the call signs of stations on a spotting network

C. A manual technique for rapidly zero beating or tuning to a station's frequency before calling that station

D. An automatic method for rapidly zero beating or tuning to a station's frequency before calling that station

*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: E2E08*

**Which of the following HF digital modes can be used to transfer binary files?**

A. Hellschreiber

✔ **B. PACTOR**

C. RTTY

D. AMTOR

# Subelement E3

*13: E3A06*

**Which of the following is required for microwave propagation via rain scatter?**

A. Rain droplets must be electrically charged

B. Rain droplets must be within the E layer

✔ **C. The rain must be within radio range of both stations**

D. All of these choices are correct

*14: E3B03*

**What is the best time of day for transequatorial propagation?**

A. Morning

B. Noon

✔ **C. Afternoon or early evening**

D. Late at night

*15: E3C08*
**What does the space weather term G5 mean?**
✔ **A. An extreme geomagnetic storm**
xB. Very low solar activity
C. Moderate solar wind
D. Waning sunspot numbers

# Subelement E4

*16: E4A14*
**What is the purpose of the prescaler function on a frequency counter?**
A. It amplifies low level signals for more accurate counting
B. It multiplies a higher frequency signal so a low-frequency counter can display the operating frequency
C. It prevents oscillation in a low-frequency counter circuit
✔ **D. It divides a higher frequency signal so a low-frequency counter can display the input frequency**

*17: E4B14*
**What happens if a dip meter is too tightly coupled to a tuned circuit being checked?**
A. Harmonics are generated
✔ **B. A less accurate reading results**
C. Cross modulation occurs
D. Intermodulation distortion occurs

*18: E4C12*
**What is an undesirable effect of using too wide a filter bandwidth in the IF section of a receiver?**
A. Output-offset overshoot
B. Filter ringing
C. Thermal-noise distortion
✔ **D. Undesired signals may be heard**

*19: E4D09*
**What is the purpose of the preselector in a communications receiver?**
A. To store often-used frequencies
B. To provide a range of AGC time constants
✔ **C. To increase rejection of unwanted signals**
D. To allow selection of the optimum RF amplifier device

*20: E4E16*
**What current flows equally on all conductors of an unshielded multi-conductor cable?**
A. Differential-mode current

✔ **B. Common-mode current**

C. Reactive current only

D. Return current

# Subelement E5

*21: E5A08*

**What is the phase relationship between the current through and the voltage across a series resonant circuit at resonance?**

A. The voltage leads the current by 90 degrees

B. The current leads the voltage by 90 degrees

✔ **C. The voltage and current are in phase**

D. The voltage and current are 180 degrees out of phase

*22: E5B01*

**What is the term for the time required for the capacitor in an RC circuit to be charged to 63.2% of the applied voltage?**

A. An exponential rate of one

✔ **B. One time constant**

C. One exponential period

D. A time factor of one

*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?**

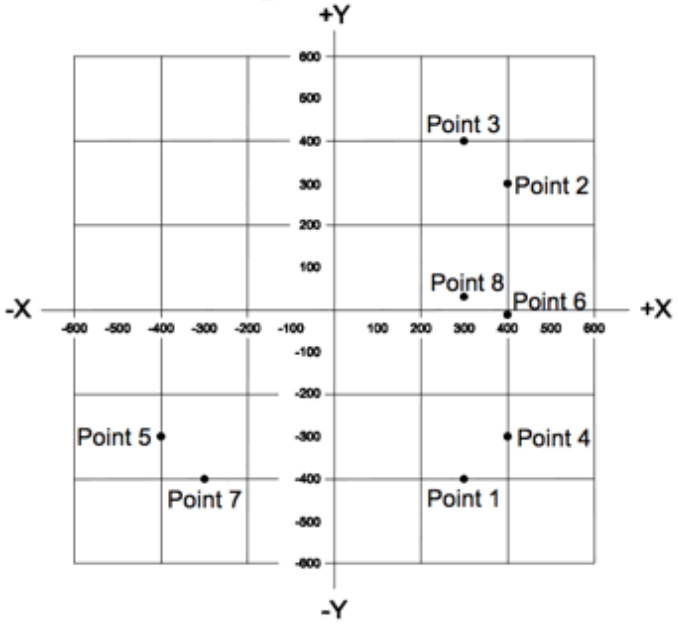
✔ **A. Point 1**

B. Point 3

C. Point 7

D. Point 8

**Figure E5-2**



*24: E5D14*

**What is reactive power?**

✔ **A. Wattless, nonproductive power**

B. Power consumed in wire resistance in an inductor

C. Power lost because of capacitor leakage

D. Power consumed in circuit Q

# Subelement E6

*25: E6A04*

**What is the name given to an impurity atom that adds holes to a semiconductor crystal structure?**

A. Insulator impurity

B. N-type impurity

✔ **C. Acceptor impurity**

D. Donor impurity

*26: E6B10*

**In Figure E6-3, what is the schematic symbol for a light-emitting diode?**

A. 1

✔ **B. 5**

C. 6

D. 7

Figure E6-3

*27: E6C08*

**In Figure E6-5, what is the schematic symbol for a NAND gate?**

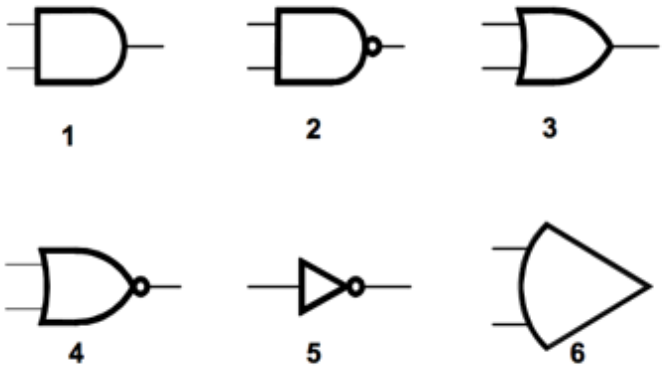
A. 1

✔ **B. 2**

C. 3

D. 4

**Figure E6-5**




*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: E6F04*

**What is the photovoltaic effect?**

A. The conversion of voltage to current when exposed to light

✔ **B. The conversion of light to electrical energy**

C. The conversion of electrical energy to mechanical energy

D. The tendency of a battery to discharge when used outside

## Subelement E7

*31: E7A02*

**What is the function of a decade counter digital IC?**

✔ **A. It produces one output pulse for every ten input pulses**

B. It decodes a decimal number for display on a seven segment LED display

C. It produces ten output pulses for every input pulse

D. It adds two decimal numbers together

*32: E7B13*

**In Figure E7-2, what is the purpose of R?**

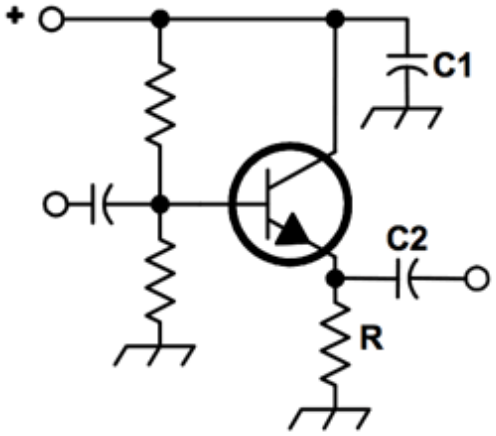
✔ **A. Emitter load**

B. Fixed bias

C. Collector load

D. Voltage regulation

**Figure E7-2**




*33: E7C03*

**What advantage does a Pi-L-network have over a regular Pi-network for impedance matching between the final amplifier of a vacuum-tube transmitter and an antenna?**

✔ **A. Greater harmonic suppression**

B. Higher efficiency

C. Lower losses

xD. Greater transformation range

*34: E7D11*

**What circuit element is controlled by a series analog voltage regulator to maintain a constant output voltage?**

A. Reference voltage

B. Switching inductance

C. Error amplifier

✔ **D. Pass transistor**

*35: E7E10*

**How does a diode detector function?**

✔ **A. By rectification and filtering of RF signals**

B. By breakdown of the Zener voltage

C. By mixing signals with noise in the transition region of the diode

D. By sensing the change of reactance in the diode with respect to frequency

*36: E7F14*

**Which of the following would allow a digital signal processing filter to create a sharper filter response?**

A. Higher data rate

✔ **B. More taps**

C. Complex phasor representations

D. Double-precision math routines

*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: E7H04*

**How is positive feedback supplied in a Colpitts oscillator?**

A. Through a tapped coil

B. Through link coupling

✔ **C. Through a capacitive divider**

D. Through a neutralizing capacitor

## Subelement E8

*39: E8A04*

**What is "dither" with respect to analog to digital converters?**

A. An abnormal condition where the converter cannot settle on a value to represent the signal

✔ **B. A small amount of noise added to the input signal to allow more precise representation of a signal over time**

C. An error caused by irregular quantization step size

D. A method of decimation by randomly skipping samples

*40: E8B02*

**How does the modulation index of a phase-modulated emission vary with RF carrier frequency (the modulated frequency)?**

A. It increases as the RF carrier frequency increases

B. It decreases as the RF carrier frequency increases

C. It varies with the square root of the RF carrier frequency

✔ **D. It does not depend on the RF carrier frequency**

*41: E8C01*

**How is Forward Error Correction implemented?**

A. By the receiving station repeating each block of three data characters

B. By transmitting a special algorithm to the receiving station along with the data characters

✔ **C. By transmitting extra data that may be used to detect and correct transmission errors**

D. By varying the frequency shift of the transmitted signal according to a predefined algorithm

*42: E8D05*

**What is the most common method of reducing key clicks?**

✔ **A. Increase keying waveform rise and fall times**

B. Low-pass filters at the transmitter output

C. Reduce keying waveform rise and fall times

D. High-pass filters at the transmitter output

# Subelement E9

*43: E9A03*

**Why would one need to know the feed point impedance of an antenna?**

✔ **A. To match impedances in order to minimize standing wave ratio on the transmission line**

B. To measure the near-field radiation density from a transmitting antenna

C. To calculate the front-to-side ratio of the antenna

D. To calculate the front-to-back ratio of the antenna

*44: E9B09*

**What type of computer program technique is commonly used for modeling antennas?**

A. Graphical analysis

✔ **B. Method of Moments**

C. Mutual impedance analysis

D. Calculus differentiation with respect to physical properties

*45: E9C12*

**Which of the following describes an extended double Zepp antenna?**

A. A wideband vertical antenna constructed from precisely tapered aluminum tubing

B. A portable antenna erected using two push support poles

✔ **C. A center fed 1.25 wavelength antenna (two 5/8 wave elements in phase)**

D. An end fed folded dipole antenna

*46: E9D05*

**What is a disadvantage of using a multiband trapped antenna?**

✔ **A. It might radiate harmonics**

B. It radiates the harmonics and fundamental equally well

C. It is too sharply directional at lower frequencies

D. It must be neutralized

*47: E9E12*

**What is the primary purpose of a phasing line when used with an antenna having multiple driven elements?**

✔ **A. It ensures that each driven element operates in concert with the others to create the desired antenna pattern**

B. It prevents reflected power from traveling back down the feed line and causing harmonic radiation from the transmitter

C. It allows single-band antennas to operate on other bands

D. It makes sure the antenna has a low-angle radiation pattern

*48: E9F14*

**What impedance does a 1/2 wavelength transmission line present to a generator when the line is shorted at the far end?**

A. Very high impedance

✔ **B. Very low impedance**

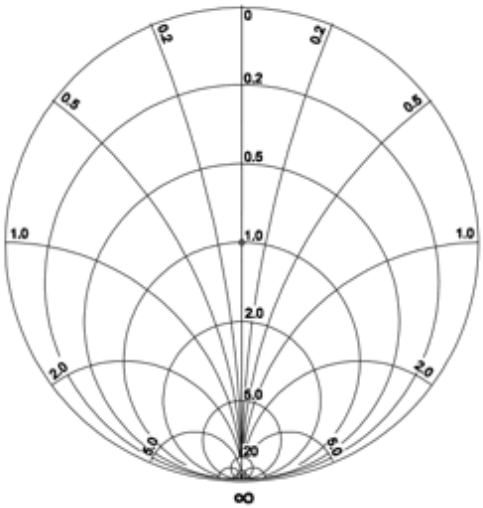
C. The same as the characteristic impedance of the line
D. The same as the output impedance of the generator

*49: E9G06*

**On the Smith chart shown in Figure E9-3, what is the name for the large outer circle on which the reactance arcs terminate?**

A. Prime axis
✔ **B. Reactance axis**
C. Impedance axis
D. Polar axis

**Figure E9-3**




*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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