

# Results for sample extra2016 test paper

Your answers are marked like this:

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

✗ *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.**

## Subelement E0

1: E0A08

**What does SAR measure?**

- A. Synthetic Aperture Ratio of the human body
- B. Signal Amplification Rating

✓ **C. The rate at which RF energy is absorbed by the body**

- D. The rate of RF energy reflected from stationary terrain

## Subelement E1

2: E1A14

**What is the maximum bandwidth for a data emission on 60 meters?**

- A. 60 Hz
- B. 170 Hz
- C. 1.5 kHz

✓ **D. 2.8 kHz**

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: E1C01

**What is a remotely controlled station?**

- A. A station operated away from its regular home location
- B. A station controlled by someone other than the licensee
- C. A station operating under automatic control

✓ **D. A station controlled indirectly through a control link**

5: E1D08

**Which VHF amateur service bands have frequencies available for space stations?**

- A. 6 meters and 2 meters
- B. 6 meters, 2 meters, and 1.25 meters
- C. 2 meters and 1.25 meters

✓ **D. 2 meters**

6: E1E03

**What is a Volunteer Examiner Coordinator?**

- A. A person who has volunteered to administer amateur operator license examinations
- B. A person who has volunteered to prepare amateur operator license examinations

✓ **C. An organization that has entered into an agreement with the FCC to coordinate amateur operator license examinations**

D. The person who has entered into an agreement with the FCC to be the VE session manager

7: E1F09

**Which of the following conditions apply when transmitting spread spectrum emission?**

- A. A station transmitting SS emission must not cause harmful interference to other stations employing other authorized emissions
- B. The transmitting station must be in an area regulated by the FCC or in a country that permits SS emissions
- C. The transmission must not be used to obscure the meaning of any communication

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

## Subelement E2

8: E2A05

**What do the letters in a satellite's mode designator specify?**

- A. Power limits for uplink and downlink transmissions
- B. The location of the ground control station
- C. The polarization of uplink and downlink signals

✓ **D. The uplink and downlink frequency ranges**

9: E2B19

**What special operating frequency restrictions are imposed on slow scan TV transmissions?**

- A. None; they are allowed on all amateur frequencies
- B. They are restricted to 7.245 MHz, 14.245 MHz, 21.345 MHz, and 28.945 MHz

☒ **C. They are restricted to phone band segments and their bandwidth can be no greater than that of a voice signal of the same modulation type**

D. They are not permitted above 54 MHz

10: E2C08

**Which of the following contacts may be confirmed through the U.S. QSL bureau system?**

A. Special event contacts between stations in the U.S.

☒ **B. Contacts between a U.S. station and a non-U.S. station**

C. Repeater contacts between U.S. club members

D. Contacts using tactical call signs

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: 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: E3B12

**What is the primary characteristic of chordal hop propagation?**

A. Propagation away from the great circle bearing between stations

☒ **B. Successive ionospheric reflections without an intermediate reflection from the ground**

C. Propagation across the geomagnetic equator

D. Signals reflected back toward the transmitting station

15: E3C02

**What is indicated by a rising A or K index?**

☒ **A. Increasing disruption of the geomagnetic field**

B. Decreasing disruption of the geomagnetic field

C. Higher levels of solar UV radiation

D. An increase in the critical frequency

## Subelement E4

16: E4A13

**How is the compensation of an oscilloscope probe typically adjusted?**

☒ **A. A square wave is displayed and the probe is adjusted until the horizontal portions of the displayed wave are as nearly flat as possible**

B. A high frequency sine wave is displayed and the probe is adjusted for maximum amplitude

C. A frequency standard is displayed and the probe is adjusted until the deflection time is accurate

D. A DC voltage standard is displayed and the probe is adjusted until the displayed voltage is accurate

17: E4B10

**Which of the following describes a method to measure intermodulation distortion in an SSB transmitter?**

A. Modulate the transmitter with two non-harmonically related radio frequencies and observe the RF output with a spectrum analyzer

☒ **B. Modulate the transmitter with two non-harmonically related audio frequencies and observe the RF output with a spectrum analyzer**

C. Modulate the transmitter with two harmonically related audio frequencies and observe the RF output with a peak reading wattmeter

D. Modulate the transmitter with two harmonically related audio frequencies and observe the RF output with a logic analyzer

18: E4C03

**What is the term for the blocking of one FM phone signal by another, stronger FM phone signal?**

A. Desensitization

B. Cross-modulation interference

☒ **C. Capture effect**

D. Frequency discrimination

19: E4D04

**Which of the following may reduce or eliminate intermodulation interference in a repeater caused by another transmitter operating in close proximity?**

A. A band-pass filter in the feed line between the transmitter and receiver

☒ **B. A properly terminated circulator at the output of the transmitter**

C. A Class C final amplifier

D. A Class D final amplifier

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: E5A10

**How is the Q of an RLC series resonant circuit calculated?**

- ☒ **A. Reactance of either the inductance or capacitance divided by the resistance**
- ☒ **B. Reactance of either the inductance or capacitance times the resistance**
- C. Resistance divided by the reactance of either the inductance or capacitance
- D. Reactance of the inductance times the reactance of the capacitance

22: E5B10

**What is the relationship between the current through an inductor and the voltage across an inductor?**

- ☒ **A. Voltage leads current by 90 degrees**
- B. Current leads voltage by 90 degrees
- C. Voltage and current are 180 degrees out of phase
- D. Voltage and current are in phase

23: E5C07

**What is a vector?**

- A. The value of a quantity that changes over time
- ☒ **B. A quantity with both magnitude and an angular component**
- C. The inverse of the tangent function
- D. The inverse of the sine function

24: E5D07

**What determines the strength of the magnetic field around a conductor?**

- A. The resistance divided by the current
- B. The ratio of the current to the resistance
- C. The diameter of the conductor
- ☒ **D. The amount of current flowing through the conductor**

## Subelement E6

25: E6A07

**Which of the following indicates that a silicon NPN junction transistor is biased on?**

- A. Base-to-emitter resistance of approximately 6 to 7 ohms
- B. Base-to-emitter resistance of approximately 0.6 to 0.7 ohms
- C. Base-to-emitter voltage of approximately 6 to 7 volts

✓ **D. Base-to-emitter voltage of approximately 0.6 to 0.7 volts**

26: E6B09

**What is a common use for point contact diodes?**

- A. As a constant current source
- B. As a constant voltage source

✓ **C. As an RF detector**

- D. As a high voltage rectifier

27: E6C14

**What is the primary advantage of using a Programmable Gate Array (PGA) in a logic circuit?**

- A. Many similar gates are less expensive than a mixture of gate types

✓ **B. Complex logic functions can be created in a single integrated circuit**

- C. A PGA contains its own internal power supply
- D. All of these choices are correct

28: E6D16

**What is the common name for a capacitor connected across a transformer secondary that is used to absorb transient voltage spikes?**

- A. Clipper capacitor
- B. Trimmer capacitor
- C. Feedback capacitor

✓ **D. Snubber capacitor**

29: E6E02

**Which of the following device packages is a through-hole type?**

✓ **A. DIP**

- B. PLCC
- C. Ball grid array
- D. SOT

30: E6F12

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

- A. Protons
- B. Photons

✓ **C. Electrons**

- D. Holes

## Subelement E7

31: E7A11

**What type of logic defines "1" as a high voltage?**

- A. Reverse Logic
- B. Assertive Logic
- C. Negative logic

✓ **D. Positive Logic**

32: E7B06

**Which of the following amplifier types reduces or eliminates even order harmonics?**

- A. Push-push

✓ **B. Push-pull**

- C. Class C
- D. Class AB

33: E7C04

**How does an impedance-matching circuit transform a complex impedance to a resistive impedance?**

- A. It introduces negative resistance to cancel the resistive part of impedance
- B. It introduces transconductance to cancel the reactive part of impedance

✓ **C. It cancels the reactive part of the impedance and changes the resistive part to a desired value**

D. Network resistances are substituted for load resistances and reactances are matched to the resistances

34: E7D06

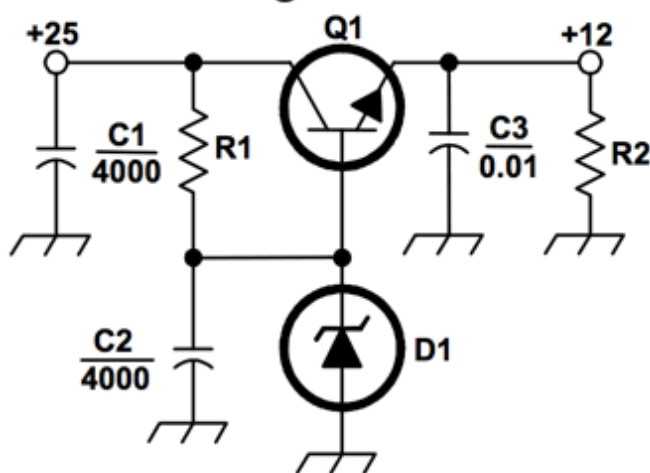
**What is the purpose of Q1 in the circuit shown in Figure E7-3?**

- A. It provides negative feedback to improve regulation
- B. It provides a constant load for the voltage source

✓ **C. It increases the current-handling capability of the regulator**

- D. It provides D1 with current

**Figure E7- 3**



35: E7E01

**Which of the following can be used to generate FM phone emissions?**

- A. A balanced modulator on the audio amplifier

✓ **B. A reactance modulator on the oscillator**

- C. A reactance modulator on the final amplifier
- D. A balanced modulator on the oscillator

36: E7F15

Which of the following is an advantage of a Finite Impulse Response (FIR) filter vs an Infinite Impulse Response (IIR) digital filter?

- ✓ A. FIR filters delay all frequency components of the signal by the same amount
- B. FIR filters are easier to implement for a given set of passband rolloff requirements
- C. FIR filters can respond faster to impulses

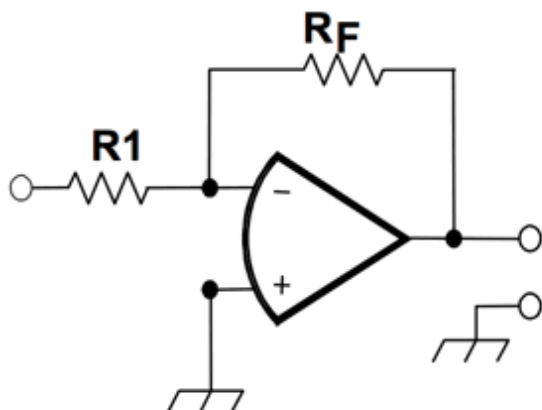
x D. All of these choices are correct

37: E7G10

What absolute voltage gain can be expected from the circuit in Figure E7-4 when R1 is 1800 ohms and RF is 68 kilohms?

- A. 1
- B. 0.03
- ✓ C. 38
- D. 76

Figure E7-4



38: E7H02

Which describes a microphonic?

- A. An IC used for amplifying microphone signals
- B. Distortion caused by RF pickup on the microphone cable
- C. Changes in oscillator frequency due to mechanical vibration
- D. Excess loading of the microphone by an oscillator

## Subelement E8

39: E8A02

What type of wave has a rise time significantly faster than its fall time (or vice versa)?

- A. A cosine wave
- B. A square wave
- ✓ C. A sawtooth wave
- D. A sine wave



40: E8B08

**What describes Orthogonal Frequency Division Multiplexing?**

- A. A frequency modulation technique which uses non-harmonically related frequencies
- B. A bandwidth compression technique using Fourier transforms
- C. A digital mode for narrow band, slow speed transmissions
- ✓ D. A digital modulation technique using subcarriers at frequencies chosen to avoid intersymbol interference

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: E8D08

**What parameter might indicate that excessively high input levels are causing distortion in an AFSK signal?**

- A. Signal to noise ratio
- B. Baud rate
- C. Repeat Request Rate (RRR)
- ✓ D. Intermodulation Distortion (IMD)

## Subelement E9

43: E9A16

**What is the effective radiated power relative to a dipole of a repeater station with 200 watts transmitter power output, 4 dB feed line loss, 3.2 dB duplexer loss, 0.8 dB circulator loss, and 10 dBd antenna gain?**

- ✓ A. 317 watts
- B. 2000 watts
- C. 126 watts
- D. 300 watts

44: E9B08

**How can the approximate beam-width in a given plane of a directional antenna be determined?**

- ✓ A. Note the two points where the signal strength of the antenna is 3 dB less than maximum and compute the angular difference
- B. Measure the ratio of the signal strengths of the radiated power lobes from the front and rear of the antenna
- C. Draw two imaginary lines through the ends of the elements and measure the angle between the lines
- D. Measure the ratio of the signal strengths of the radiated power lobes from the front and side of the antenna

45: E9C01

**What is the radiation pattern of two 1/4-wavelength vertical antennas spaced 1/2-wavelength apart and fed 180 degrees out of phase?**

- A. Cardioid
- B. Omni-directional
- C. A figure-8 broadside to the axis of the array
- ✓ **D. A figure-8 oriented along the axis of the array**

46: E9D03

**Where should a high Q loading coil be placed to minimize losses in a shortened vertical antenna?**

- ✓ **A. Near the center of the vertical radiator**
- B. As low as possible on the vertical radiator
- C. As close to the transmitter as possible
- D. At a voltage node

47: E9E03

**What is the name of the matching system that uses a section of transmission line connected in parallel with the feed line at or near the feed point?**

- A. The gamma match
- B. The delta match
- C. The omega match
- ✓ **D. The stub match**

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: E9G04

**What are the two families of circles and arcs that make up a Smith chart?**

- A. Resistance and voltage
- B. Reactance and voltage
- ✓ **C. Resistance and reactance**
- D. Voltage and impedance

50: E9H08

**What is the function of a sense antenna?**

- ✓ **A. It modifies the pattern of a DF antenna array to provide a null in one direction**
- B. It increases the sensitivity of a DF antenna array
- C. It allows DF antennas to receive signals at different vertical angles
- D. It provides diversity reception that cancels multipath signals

**Results:**

**You scored 48 correct answers and 2 incorrect answers from a total of 50.**

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

e)

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