# 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: E1B08*
**What limitations may the FCC place on an amateur station if its signal causes interference to domestic broadcast reception, assuming that the receivers involved are of good engineering design?**
A. The amateur station must cease operation
B. The amateur station must cease operation on all frequencies below 30 MHz
C. The amateur station must cease operation on all frequencies above 30 MHz

✔ **D. The amateur station must avoid transmitting during certain hours on frequencies that cause the interference**

*4: E1C08*

**What is the maximum permissible duration of a remotely controlled station's transmissions if its control link malfunctions?**

A. 30 seconds

✔ **B. 3 minutes**

C. 5 minutes

D. 10 minutes

*5: E1D09*

**Which UHF amateur service bands have frequencies available for a space station?**

A. 70 cm only

✔ **B. 70 cm and 13 cm**

C. 70 cm and 33 cm

D. 33 cm and 13 cm

*6: E1E14*

**For which types of out-of-pocket expenses do the Part 97 rules state that VEs and VECs may be reimbursed?**

✔ **A. Preparing, processing, administering and coordinating an examination for an amateur radio license**

B. Teaching an amateur operator license examination preparation course

C. No expenses are authorized for reimbursement

D. Providing amateur operator license examination preparation training materials

*7: E1F10*

**What is the maximum permitted transmitter peak envelope power for an amateur station transmitting spread spectrum communications?**

A. 1 W

B. 1.5 W

✔ **C. 10 W**

D. 1.5 kW

## Subelement E2

*8: E2A09*

**What do the terms L band and S band specify with regard to satellite communications?**

✔ **A. The 23 centimeter and 13 centimeter bands**

B. The 2 meter and 70 centimeter bands

xC. FM and Digital Store-and-Forward systems

D. Which sideband to use

*9: E2B18*

**On which of the following frequencies is one likely to find FM ATV transmissions?**

A. 14.230 MHz
B. 29.6 MHz
C. 52.525 MHz
✔ **D. 1255 MHz**

*10: E2C11*

**How should you generally identify your station when attempting to contact a DX station during a contest or in a pileup?**

✔ **A. Send your full call sign once or twice**
B. Send only the last two letters of your call sign until you make contact
C. Send your full call sign and grid square
D. Send the call sign of the DX station three times, the words "this is", then your call sign three times

*11: E2D10*

**How can an APRS station be used to help support a public service communications activity?**

A. An APRS station with an emergency medical technician can automatically transmit medical data to the nearest hospital
B. APRS stations with General Personnel Scanners can automatically relay the participant numbers and time as they pass the check points
✔ **C. An APRS station with a GPS unit can automatically transmit information to show a mobile station's position during the event**
D. All of these choices are correct

*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: E3A13*

**Which emission mode is best for aurora propagation?**

✔ **A. CW**
B. SSB
C. FM
D. RTTY

*14: E3B10*

**What is the cause of gray-line propagation?**

A. At midday, the Sun super heats the ionosphere causing increased refraction of radio

waves

✔ **B. At twilight and sunrise, D-layer absorption is low while E-layer and F-layer propagation remains high**

C. In darkness, solar absorption drops greatly while atmospheric ionization remains steady

D. At mid-afternoon, the Sun heats the ionosphere decreasing radio wave refraction and the MUF

*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: E4A02*

**Which of the following parameters would a spectrum analyzer display on the vertical and horizontal axes?**

A. RF amplitude and time

✔ **B. RF amplitude and frequency**

C. SWR and frequency

D. SWR and time

*17: E4B17*

**What three test loads are used to calibrate a standard RF vector network analyzer?**

A. 50 ohms, 75 ohms, and 90 ohms

✔ **B. Short circuit, open circuit, and 50 ohms**

C. Short circuit, open circuit, and resonant circuit

D. 50 ohms through 1/8 wavelength, 1/4 wavelength, and 1/2 wavelength of coaxial cable

*18: E4C06*

**A CW receiver with the AGC off has an equivalent input noise power density of -174 dBm/Hz. What would be the level of an unmodulated carrier input to this receiver that would yield an audio output SNR of 0 dB in a 400 Hz noise bandwidth?**

A. -174 dBm

B. -164 dBm

C. -155 dBm

✔ **D. -148 dBm**

*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: E4E03*
**Which of the following signals might a receiver noise blanker be able to remove from desired signals?**
A. Signals which are constant at all IF levels
✔ **B. Signals which appear across a wide bandwidth**
C. Signals which appear at one IF but not another
D. Signals which have a sharply peaked frequency distribution

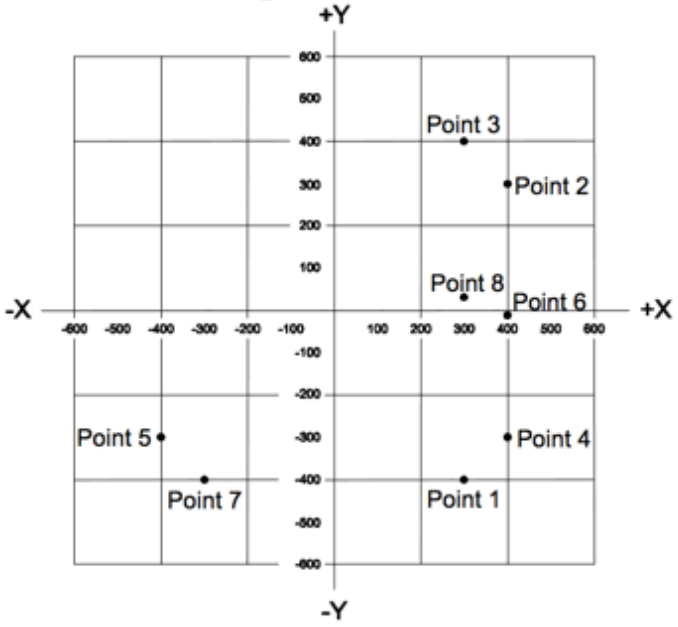
# Subelement E5

*21: E5A07*
**What is the magnitude of the current at the input of a parallel RLC circuit at resonance?**
✔ **A. Minimum**
B. Maximum
C. R/L
D. L/R

*22: E5B06*
**What is susceptance?**
A. The magnetic impedance of a circuit
B. The ratio of magnetic field to electric field
✔ **C. The inverse of reactance**
D. A measure of the efficiency of a transformer

*23: E5C14*
**Which point on Figure E5-2 best represents the impedance of a series circuit consisting of a 400 ohm resistor and a 38 picofarad capacitor at 14 MHz?**
A. Point 2
✔ **B. Point 4**
C. Point 5
D. Point 6

**Figure E5-2**




*24: E5D08*

**What type of energy is stored in an electromagnetic or electrostatic field?**

A. Electromechanical energy

✔ **B. Potential energy**

C. Thermodynamic energy

D. Kinetic energy

# Subelement E6

*25: E6A11*

**In Figure E6-2, what is the schematic symbol for a P-channel junction FET?**

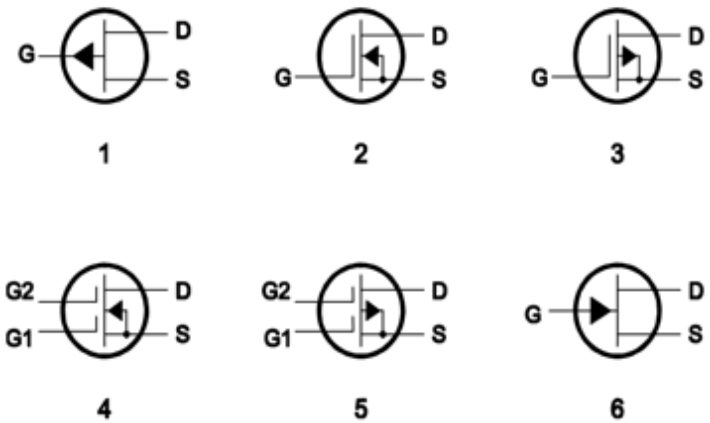
✔ **A. 1**

B. 2

C. 3

D. 6

**Figure E6-2**



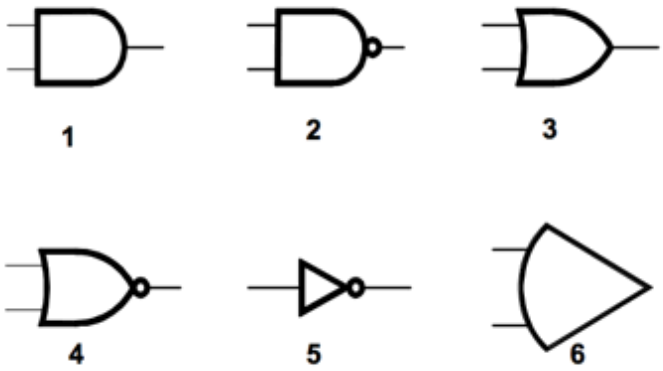

*26: E6B06*

**Which of the following is a common use of a hot-carrier diode?**

A. As balanced mixers in FM generation
B. As a variable capacitance in an automatic frequency control circuit
C. As a constant voltage reference in a power supply
✔ **D. As a VHF/UHF mixer or detector**

*27: E6C10*
**In Figure E6-5, what is the schematic symbol for a NOR gate?**
A. 1
B. 2
C. 3
✔ **D. 4**

**Figure E6-5**




*28: E6D12*
**What is the definition of saturation in a ferrite core inductor?**
A. The inductor windings are over coupled
B. The inductor's voltage rating is exceeded causing a flashover
✔ **C. The ability of the inductor's core to store magnetic energy has been exceeded**
D. Adjacent inductors become over-coupled

*29: E6E01*
**Which of the following is true of a charge-coupled device (CCD)?**
A. Its phase shift changes rapidly with frequency
x B. It is a CMOS analog-to-digital converter
✔ **C. It samples an analog signal and passes it in stages from the input to the output**
D. It is used in a battery charger circuit

*30: E6F07*
**What is a solid state relay?**
A. A relay using transistors to drive the relay coil
✔ **B. A device that uses semiconductors to implement the functions of an electromechanical relay**
C. A mechanical relay that latches in the on or off state each time it is pulsed
D. A passive delay line

# Subelement E7

*31: E7A06*

**What is a characteristic of a monostable multivibrator?**

✔ **A. It switches momentarily to the opposite binary state and then returns to its original state after a set time**

B. It produces a continuous square wave oscillating between 1 and 0

C. It stores one bit of data in either a 0 or 1 state

D. It maintains a constant output voltage, regardless of variations in the input voltage

*32: E7B11*

**In Figure E7-1, what is the purpose of R3?**

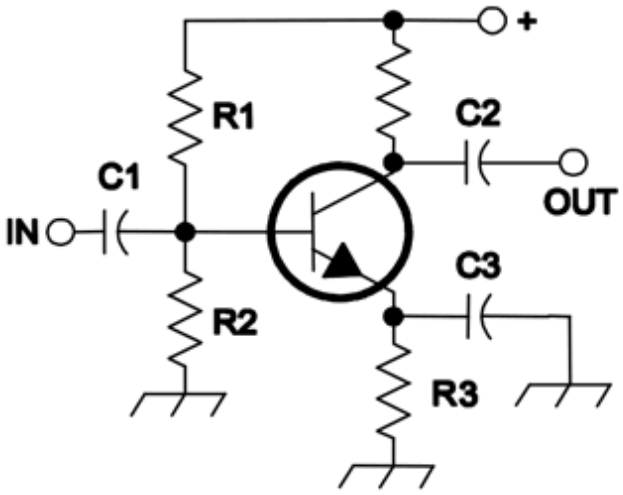
A. Fixed bias

B. Emitter bypass

C. Output load resistor

✔ **D. Self bias**

**Figure E7-1**




*33: E7C06*

**What are the distinguishing features of an elliptical filter?**

A. Gradual passband rolloff with minimal stop band ripple

B. Extremely flat response over its pass band with gradually rounded stop band corners

✔ **C. Extremely sharp cutoff with one or more notches in the stop band**

D. Gradual passband rolloff with extreme stop band ripple

*34: E7D03*

**What device is typically used as a stable reference voltage in a linear voltage regulator?**

✔ **A. A Zener diode**

B. A tunnel diode

C. An SCR

D. A varactor diode

*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: 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: E7G08*

**How does the gain of an ideal operational amplifier vary with frequency?**

A. It increases linearly with increasing frequency

B. It decreases linearly with increasing frequency

C. It decreases logarithmically with increasing frequency

✔ **D. It does not vary with frequency**

*38: E7H14*

**What is a phase-locked loop circuit?**

A. An electronic servo loop consisting of a ratio detector, reactance modulator, and voltage-controlled oscillator

B. An electronic circuit also known as a monostable multivibrator

✔ **C. An electronic servo loop consisting of a phase detector, a low-pass filter, a voltage-controlled oscillator, and a stable reference oscillator**

D. An electronic circuit consisting of a precision push-pull amplifier with a differential input

# Subelement E8

*39: E8A10*

**What is the purpose of a low pass filter used in conjunction with a digital-to-analog converter?**

A. Lower the input bandwidth to increase the effective resolution

B. Improve accuracy by removing out of sequence codes from the input

✔ **C. Remove harmonics from the output caused by the discrete analog levels generated**

x D. All of these choices are correct

*40: E8B09*

**What is meant by deviation ratio?**

A. The ratio of the audio modulating frequency to the center carrier frequency

✔ **B. The ratio of the maximum carrier frequency deviation to the highest audio modulating frequency**

C. The ratio of the carrier center frequency to the audio modulating frequency

D. The ratio of the highest audio modulating frequency to the average audio modulating frequency

*41: E8C06*

**What is the necessary bandwidth of a 170-hertz shift, 300-baud ASCII transmission?**

A. 0.1 Hz

B. 0.3 kHz

✔ **C. 0.5 kHz**

D. 1.0 kHz

*42: E8D10*

**What are some of the differences between the Baudot digital code and ASCII?**

A. Baudot uses 4 data bits per character, ASCII uses 7 or 8; Baudot uses 1 character as a letters/figures shift code, ASCII has no letters/figures code

✔ **B. Baudot uses 5 data bits per character, ASCII uses 7 or 8; Baudot uses 2 characters as letters/figures shift codes, ASCII has no letters/figures shift code**

C. Baudot uses 6 data bits per character, ASCII uses 7 or 8; Baudot has no letters/figures shift code, ASCII uses 2 letters/figures shift codes

D. Baudot uses 7 data bits per character, ASCII uses 8; Baudot has no letters/figures shift code, ASCII uses 2 letters/figures shift codes

## Subelement E9

*43: E9A08*

**What is meant by antenna bandwidth?**

A. Antenna length divided by the number of elements

✔ **B. The frequency range over which an antenna satisfies a performance requirement**

C. The angle between the half-power radiation points

D. The angle formed between two imaginary lines drawn through the element ends

*44: E9B03*

**In the antenna radiation pattern shown in Figure E9-1, what is the front-to-side ratio?**

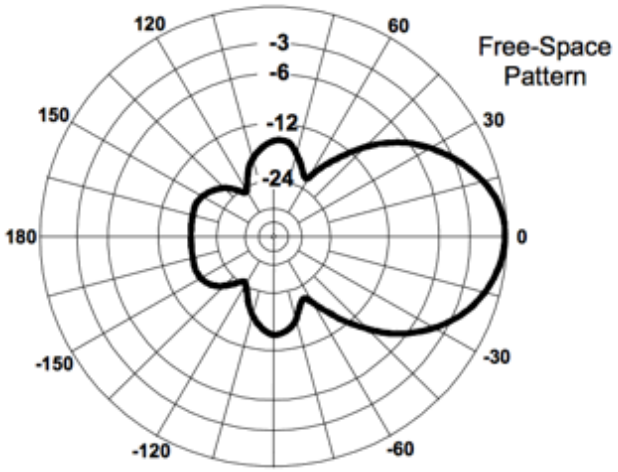
A. 12 dB

✔ **B. 14 dB**

C. 18 dB

D. 24 dB

**Figure E9-1**




*45: E9C02*

**What is the radiation pattern of two 1/4 wavelength vertical antennas spaced 1/4 wavelength apart and fed 90 degrees out of phase?**

✔ **A. Cardioid**

B. A figure-8 end-fire along the axis of the array

C. A figure-8 broadside to the axis of the array

D. Omni-directional

*46: E9D12*

**Which of the following would provide the best RF ground for your station?**

A. A 50 ohm resistor connected to ground

xB. An electrically short connection to a metal water pipe

✔ **C. An electrically short connection to 3 or 4 interconnected ground rods driven into the Earth**

D. An electrically short connection to 3 or 4 interconnected ground rods via a series RF choke

*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: E9F09*

**What is the approximate physical length of a solid polyethylene dielectric coaxial transmission line that is electrically one-quarter wavelength long at 7.2 MHz?**

A. 10 meters

✔ **B. 6.9 meters**

C. 24 meters

D. 50 meters

*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: E9H04*

**What is an advantage of using a shielded loop antenna for direction finding?**

A. It automatically cancels ignition noise in mobile installations
✔ **B. It is electro statically balanced against ground, giving better nulls**
C. It eliminates tracking errors caused by strong out-of-band signals
D. It allows stations to communicate without giving away their position

**Results:**
**You scored 46 correct answers and 4 incorrect answers from a total of 50.**

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

**e)**

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