



Amateur Radio Operator Certificate Examination

Advanced Qualification

2024-07-27

To pass this exam, you must correctly answer 35 out of 50 questions

Exam Number: 1000801

1. (A-001-005-004)

What is the Q of a parallel RLC circuit, if it is resonant at 14.225 MHz, L is 3.5 microhenrys and R is 10 kilohms?

- A. 71.5
- B. 0.0319
- C. 7.35
- D. 31.9

2. (A-007-002-007)

What is a typical velocity factor for coaxial cable with polyethylene dielectric?

- A. 0.33
- B. 0.1
- C. 2.7
- D. 0.66

3. (A-007-003-006)

A quarter-wave stub, for use at 15 MHz, is made from a coaxial cable having a velocity factor of 0.8. Its physical length will be:

- A. 8 m (26.2 ft)
- B. 4 m (13.1 ft)
- C. 7.5 m (24.6 ft)
- D. 12 m (39.4 ft)

4. (A-007-009-001)

Waveguide is typically used:

- A. at frequencies above 3000 MHz
- B. at frequencies above 2 MHz
- C. at frequencies below 150 MHz
- D. at frequencies below 1500 MHz

5. (A-007-001-005)

What is a pi-network?

- A. A network consisting of four inductors or four capacitors
- B. A network consisting of one inductor and two capacitors or two inductors and one capacitor
- C. A power incidence network
- D. An antenna matching network that is isolated from ground

6. (A-001-002-008)

In what direction is the magnetic field oriented about a conductor in relation to the direction of electron flow?

- A. In all directions
- B. In the direction determined by the left-hand rule
- C. In the direct opposite to the current
- D. In the same direction as the current

7. (A-004-004-005)

The regulation of short-term changes in the load resistance of a power supply is called:

- A. static regulation
- B. dynamic regulation
- C. active regulation
- D. analog regulation

8. (A-005-005-008)

Some types of deviation meters work on the principle of:

- A. a carrier null and multiplying the modulation frequency by the modulation index
- B. detecting the frequencies in the sidebands
- C. the amplitude of power in the sidebands
- D. a carrier peak and dividing by the modulation index

9. (A-001-003-008)

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 3 microhenrys and C is 15 picofarads?

- A. 23.7 MHz
- B. 35.4 MHz
- C. 23.7 kHz
- D. 35.4 kHz

10. (A-003-002-007)

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. 1250 watts
- C. 2500 watts
- D. 625 watts

11. (A-006-003-011)

Normally, front-end selectivity is provided by the resonant networks both before and after the RF stage in a superheterodyne receiver. This whole section of the receiver is often referred to as the:

- A. preamble
- B. pass-selector
- C. preselector
- D. preamplifier

12. (A-005-007-002)

Speech compression associated with SSB transmission implies:

- A. full amplification of high level signals and reducing or eliminating signals amplification of low level
- B. full amplification of low level signals and reducing or eliminating amplification of high level signals
- C. a lower signal-to-noise ratio
- D. circuit level instability

13. (A-007-005-006)

Which of the following is NOT a valid parabolic dish illumination arrangement?

- A. Offset feed
- B. Front feed
- C. Newtonian
- D. Cassegrain

14. (A-003-004-001)

What does a frequency counter do?

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

15. (A-002-004-001)

What is an enhancement-mode FET?

- A. An FET without a channel to hinder current through the gate
- B. An FET with a channel that allows current when the gate voltage is zero
- C. An FET without a channel; no current occurs with zero gate voltage
- D. An FET with a channel that blocks voltage through the gate

16. (A-002-005-007)

The silicon controlled rectifier (SCR) is a member of which family?

- A. Phase locked loops
- B. Thyristors
- C. Varactors
- D. Varistors

17. (A-005-004-008)

What audio frequencies are used in a two-tone test of the linearity of a single-sideband phone transmitter?

- A. 1200 Hz and 2400 Hz tones must be used
- B. Any two audio tones may be used, but they must be within the transmitter audio passband, and should not be harmonically related
- C. 20 Hz and 20 kHz tones must be used
- D. Any two audio tones may be used, but they must be within the transmitter audio passband, and must be harmonically related

18. (A-003-003-011)

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

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

19. (A-003-005-005)

An oscilloscope cannot be used to:

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

20. (A-007-006-010)

A transmitter has an output of 2000 watts PEP. The transmission line, connectors and antenna tuner have a composite loss of 1 dB, and the gain from the stacked Yagi antenna is 10 dBd. What is the Effective Radiated Power (ERP) in watts PEP?

- A. 2009
- B. 16 000
- C. 20 000
- D. 18 000

21. (A-002-008-001)

What is an operational amplifier (op-amp)?

- A. A program subroutine that calculates the gain of an RF amplifier
- B. An amplifier used to increase the average output of frequency modulated amateur signals to the legal limit
- C. A high-gain, direct-coupled differential amplifier whose characteristics are determined by components mounted externally
- D. A high-gain, direct-coupled audio amplifier whose characteristics are determined by internal components of the device

22. (A-002-007-003)

What are the advantages of a Darlington pair audio amplifier?

- A. Mutual gain, low input impedance and low output impedance
- B. High gain, high input impedance and low output impedance
- C. Mutual gain, high stability and low mutual inductance
- D. Low output impedance, high mutual impedance and low output current

23. (A-004-002-001)

Filter chokes are rated according to:

- A. inductance and current-handling capacity
- B. power loss
- C. breakdown voltage
- D. reactance at 1000 Hz

24. (A-005-006-004)

If a receiver tuned to 146.70 MHz receives an intermodulation product signal whenever a nearby transmitter transmits on 146.52, what are the two most likely frequencies for the other interfering signal?

- A. 73.35 MHz and 239.40 MHz
- B. 146.88 MHz and 146.34 MHz
- C. 146.34 MHz and 146.61 MHz
- D. 146.01 MHz and 147.30 MHz

25. (A-006-005-011)

Which of these measurements is a good indicator of VHF receiver performance in an environment of strong out-of-band signals?

- A. Blocking Dynamic Range
- B. Two-tone Third-Order IMD Dynamic Range, 10 MHz spacing
- C. Third-Order Intercept Point
- D. Intermediate frequency rejection ratio

26. (A-005-001-005)

Why must a very stable reference oscillator be used as part of a phase-locked loop (PLL) frequency synthesizer?

- A. Any phase variations in the reference oscillator signal will produce harmonic distortion in the modulating signal
- B. Any amplitude variations in the reference oscillator signal will prevent the loop from locking to the desired signal
- C. Any phase variations in the reference oscillator signal will produce phase noise in the synthesizer output
- D. Any amplitude variations in the reference oscillator signal will prevent the loop from changing frequency

27. (A-002-011-008)

Crystals are sometimes used in a circuit which has an output close to an integral multiple of the crystal frequency. This circuit is called:

- A. a crystal multiplier
- B. an overtone oscillator
- C. a crystal lattice
- D. a crystal ladder

28. (A-006-002-003)

The first mixer in the receiver mixes the incoming signal with the local oscillator to produce:

- A. an audio frequency
- B. an intermediate frequency
- C. a high frequency oscillator (HFO) frequency
- D. a radio frequency

29. (A-005-002-010)

After you have opened a VHF power amplifier to make internal tuning adjustments, what should you do before you turn the amplifier on?

- A. Be certain all amplifier shielding is fastened in place
- B. Be certain no antenna is attached so that you will not cause any interference
- C. Remove all amplifier shielding to ensure maximum cooling
- D. Make sure that the power interlock switch is bypassed so you can test the amplifier

30. (A-002-009-005)

A frequency multiplier circuit must be operated in:

- A. class B
- B. class A
- C. class C
- D. class AB

PRACTICE

31. (A-005-003-008)

Parasitic oscillations are usually generated due to:

- A. accidental resonant frequencies in the power amplifier
- B. a mismatch between power amplifier and transmission line
- C. harmonics from some earlier multiplier stage
- D. excessive drive or excitation to the power amplifier

32. (A-006-004-009)

AGC is derived in a receiver from one of two circuits. Depending on the method used, it is called:

- A. IF derived or RF derived
- B. RF derived or audio derived
- C. IF derived or audio derived
- D. detector derived or audio derived

33. (A-003-001-005)

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

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

34. (A-001-001-003)

What is the term for the time required for the current in an RL circuit to build up to 63.2% of the maximum value?

- A. A time factor of one
- B. One time constant
- C. An exponential period of one
- D. One exponential rate

35. (A-005-009-002)

What is the term used to describe a spread spectrum communications system where the centre frequency of a conventional carrier is changed many times per second in accordance with a pseudorandom list of channels?

- A. Direct sequence
- B. Time-domain frequency modulation
- C. Frequency companded spread spectrum
- D. Frequency hopping

36. (A-002-002-003)

What is a common use for the hot-carrier (Schottky) diode?

- A. As VHF and UHF mixers and detectors
- B. As a variable capacitance in an automatic frequency control (AFC) circuit
- C. As a constant voltage reference in a power supply
- D. As balanced mixers in FM generation

37. (A-002-001-003)

What type of semiconductor material contains fewer free electrons than pure germanium or silicon crystals?

- A. Bipolar type
- B. P-type
- C. N-type
- D. Superconductor type

38. (A-005-008-009)

The designator AX.25 is associated with which amateur radio mode?

- A. spread spectrum speech
- B. RTTY
- C. ASCII
- D. packet

39. (A-002-012-006)

On VHF and above, $1/4$ wavelength coaxial cavities are used to give protection from high-level signals. For a frequency of approximately 50 MHz, the diameter of such a device would be about 10 cm (4 in). What would be its approximate length?

- A. 2.4 metres (8 ft)
- B. 0.6 metres (2 ft)
- C. 1.5 metres (5 ft)
- D. 3.7 metres (12 ft)

40. (A-004-001-008)

Full-wave voltage doublers:

- A. are used only in high-frequency power supplies
- B. use both halves of an AC wave
- C. use less power than half-wave doublers
- D. create four times the output voltage of half-wave doublers

41. (A-002-010-008)

What is a flip-flop circuit?

- A. A binary sequential logic element with eight stable states
- B. A binary sequential logic element with one stable state
- C. A binary sequential logic element with two stable states
- D. A binary sequential logic element with four stable states

42. (A-001-004-004)

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 2 microhenrys and C is 30 picofarads?

- A. 20.5 MHz
- B. 20.5 kHz
- C. 2.65 MHz
- D. 2.65 kHz

43. (A-002-006-009)

Which class of amplifier has the poorest linearity and the most distortion?

- A. Class C
- B. Class AB
- C. Class B
- D. Class A

44. (A-002-003-004)

What is the alpha of a bipolar transistor in common base configuration?

- A. Reverse current gain
- B. Forward current gain
- C. Forward voltage gain
- D. Reverse voltage gain

45. (A-006-001-008)

Which stage of a superheterodyne receiver lies between a tuneable stage and a fixed tuned stage?

- A. Radio frequency amplifier
- B. Local oscillator
- C. Mixer
- D. Intermediate frequency amplifier

46. (A-007-004-011)

In a half-wave dipole, where does the minimum impedance occur?

- A. At the centre
- B. At the right end
- C. At both ends
- D. It is the same at all points

47. (A-007-007-003)

The plane from which ground reflections can be considered to take place, or the effective ground plane for an antenna is:

- A. at ground level exactly
- B. as much as a meter above ground
- C. several centimeters to as much as 2 meters below ground, depending upon soil conditions
- D. as much as 6 cm below ground depending upon soil conditions

48. (A-004-003-007)

What is a three-terminal regulator?

- A. A regulator that supplies three voltages with variable current
- B. A regulator containing a voltage reference, error amplifier, sensing resistors and transistors, and a pass element
- C. A regulator that supplies three voltages at a constant current
- D. A regulator containing three error amplifiers and sensing transistors

49. (A-003-006-001)

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. 40 ohms
- B. 16 ohms
- C. 24 ohms
- D. 4 ohms

50. (A-007-008-001)

What is meant by the radiation resistance of an antenna?

- A. The combined losses of the antenna elements and transmission line
- B. The resistance in the atmosphere that an antenna must overcome to be able to radiate a signal
- C. The equivalent resistance that would dissipate the same amount of power as that radiated from an antenna
- D. The specific impedance of an antenna