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The ARRL Extra Class License Course

All You Need to Pass Your Extra Class Exam

LEVEL 3: Extra

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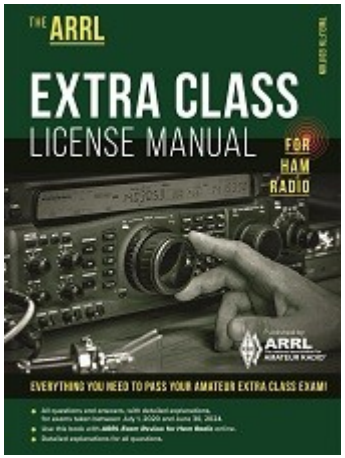

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Why should core saturation of an impedance matching transformer be avoided?

A. Harmonics and distortion could result

B. Magnetic flux would increase with frequency

C. RF susceptance would increase

D. Temporary changes of the core permeability could result

E6D01 ECLM Page (4 - 36)

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(A) E6D01 ECLM Page (4 - 36)

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

E6D02 ECLM Page (6 - 16)

What is the equivalent circuit of a quartz crystal?

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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

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(A) E6D02 ECLM Page (6 - 16)

Which of the following is an aspect of the piezoelectric effect?

A. Mechanical deformation of material by the application of a voltage

B. Mechanical deformation of material by the application of a magnetic field

C. Generation of electrical energy in the presence of light

D. Increased conductivity in the presence of light

E6D03 ECLM Page (6 - 15)

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(A) E6D03 ECLM Page (6 - 15)

Which materials are commonly used as a core in an inductor?

A. Polystyrene and polyethylene

B. Ferrite and brass

C. Teflon and Delrin

D. Cobalt and aluminum

E6D04 ECLM Page (4 - 36)

Which materials are commonly used as a core in an inductor?

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B. Ferrite and brass

C. Teflon and Delrin

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(B) E6D04 ECLM Page (4 - 36)

What is one reason for using ferrite cores rather than powdered-iron in an inductor?

A. Ferrite toroids generally have lower initial permeability

B. Ferrite toroids generally have better temperature stability

C. Ferrite toroids generally require fewer turns to produce a given inductance value

D. Ferrite toroids are easier to use with surface mount technology

E6D05 ECLM Page (4 - 36)

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(C) E6D05 ECLM Page (4 - 36)

What core material property determines the inductance of an inductor?

A. Thermal impedance

B. Resistance

C. Reactivity

D. Permeability

E6D06 ECLM Page (4 - 36)

What core material property determines the inductance of an inductor?

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B. Resistance

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D. Permeability

(D) E6D06 ECLM Page (4 - 36)

What is current in the primary winding of a transformer called if no load is attached to the secondary?

A. Magnetizing current

B. Direct current

C. Excitation current

D. Stabilizing current

E6D07 ECLM Page (4 - 36)

What is current in the primary winding of a transformer called if no load is attached to the secondary?

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(A) E6D07 ECLM Page (4 - 36)

What is one reason for using powdered-iron cores rather than ferrite cores in an inductor?

A. Powdered-iron cores generally have greater initial permeability

B. Powdered-iron cores generally maintain their characteristics at higher currents

C. Powdered-iron cores generally require fewer turns to produce a given inductance

D. Powdered-iron cores use smaller diameter wire for the same inductance

E6D08 ECLM Page (4 - 36)

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(B) E6D08 ECLM Page (4 - 36)

What devices are commonly used as VHF and UHF parasitic suppressors at the input and output terminals of a transistor HF amplifier?

A. Electrolytic capacitors

B. Butterworth filters

C. Ferrite beads

D. Steel-core toroids

E6D09 ECLM Page (4 - 37)

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(C) E6D09 ECLM Page (4 - 37)

What is a primary advantage of using a toroidal core instead of a solenoidal core in an inductor?

A. Toroidal cores confine most of the magnetic field within the core material

B. Toroidal cores make it easier to couple the magnetic energy into other components

C. Toroidal cores exhibit greater hysteresis

D. Toroidal cores have lower Q characteristics

E6D10 ECLM Page (4 - 36)

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(A) E6D10 ECLM Page (4 - 36)

Which type of core material decreases inductance when inserted into a coil?

A. Ceramic

B. Brass

C. Ferrite

D. Powdered-iron

E6D11 ECLM Page (4 - 36)

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B. Brass

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(B) E6D11 ECLM Page (4 - 36)

What is inductor saturation?

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

E6D12 ECLM Page (4 - 36)

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(C) E6D12 ECLM Page (4 - 36)

What is the primary cause of inductor self-resonance?

A. Inter-turn capacitance

B. The skin effect

C. Inductive kickback

D. Non-linear core hysteresis

E6D13 ECLM Page (4 - 34)

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(A) E6D13 ECLM Page (4 - 34)

Why is gallium arsenide (GaAs) useful for semiconductor devices operating at UHF and higher frequencies?

A. Higher noise figures

B. Higher electron mobility

C. Lower junction voltage drop

D. Lower transconductance

E6E01 ECLM Page (5 - 13)

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(B) E6E01 ECLM Page (5 - 13)

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

A. DIP

B. PLCC

C. Ball grid array

D. SOT

E6E02 ECLM Page (4 - 35)

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(A) E6E02 ECLM Page (4 - 35)

Which of the following materials is likely to provide the highest frequency of operation when used in MMICs?

A. Silicon

B Silicon nitride

C. Silicon dioxide

D. Gallium nitride

E6E03 ECLM Page (5 - 13)

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A. Silicon

B Silicon nitride

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(D) E6E03 ECLM Page (5 - 13)

Which is the most common input and output impedance of circuits that use MMICs?

A. 50 ohms

B. 300 ohms

C. 450 ohms

D. 10 ohms

E6E04 ECLM Page (5 - 12)

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(A) E6E04 ECLM Page (5 - 12)

Which of the following noise figure values is typical of a low-noise UHF preamplifier?

A. 2 dB

B. -10 dB

C. 44 dBm

D. -20 dBm

E6E05 ECLM Page (5 - 13)

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(A) E6E05 ECLM Page (5 - 13)

What characteristics of the MMIC make it a popular choice for VHF through microwave circuits?

A. The ability to retrieve information from a single signal even in the presence of other strong signals.

B. Plate current that is controlled by a control grid

C. Nearly infinite gain, very high input impedance, and very low output impedance

D. Controlled gain, low noise figure, and constant input and output impedance over the specified frequency range

E6E06 ECLM Page (5 - 12)

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(D) E6E06 ECLM Page (5 - 12)

What type of transmission line is used for connections to MMICs?

A. Miniature coax

B. Circular waveguide

C. Parallel wire

D. Microstrip

E6E07 ECLM Page (5 - 13)

What type of transmission line is used for connections to MMICs?

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(D) E6E07 ECLM Page (5 - 13)

How is power supplied to the most common type of MMIC?

A. Through a resistor and/or RF choke connected to the amplifier output lead

B. MMICs require no operating bias

C. Through a capacitor and RF choke connected to the amplifier input lead

D. Directly to the bias-voltage (VCC IN) lead

E6E08 ECLM Page (5 - 12)

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(A) E6E08 ECLM Page (5 - 12)

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

E6E09 ECLM Page (4 - 35)

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(D) E6E09 ECLM Page (4 - 35)

What advantage does surface-mount technology offer at RF compared to using through-hole components?

A. Smaller circuit area

B. Shorter circuit-board traces

C. Components have less parasitic inductance and capacitance

D. All these choices are correct

E6E10 ECLM Page (4 - 35)

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(D) E6E10 ECLM Page (4 - 35)

What is a characteristic of DIP packaging used for integrated circuits?

A. Package mounts in a direct inverted position

B. Low leakage doubly insulated package

C. Two chips in each package (Dual In Package)

D. A total of two rows of connecting pins placed on opposite sides of the package (Dual In-line Package)

E6E11 ECLM Page (4 - 35)

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(D) E6E11 ECLM Page (4 - 35)

Why are DIP through-hole package ICs not typically used at UHF and higher frequencies?

A. Too many pins

B. Epoxy coating is conductive above 300 MHz

C. Excessive lead length

D. Unsuitable for combining analog and digital signals

E6E12 ECLM Page (4 - 33)

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(C) E6E12 ECLM Page (4 - 33)

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

A. Protons

B. Photons

C. Electrons

D. Holes

E6F01 ECLM Page (5 - 17)

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

A. Protons

B. Photons

C. Electrons

D. Holes

(C) E6F01 ECLM Page (5 - 17)

What happens to the conductivity of a photoconductive material when light shines on it?

A. It increases

B. It decreases

C. It stays the same

D. It becomes unstable

E6F02 ECLM Page (5 - 15)

What happens to the conductivity of a photoconductive material when light shines on it?

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B. It decreases

C. It stays the same

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(A) E6F02 ECLM Page (5 - 15)

What is the most common configuration of an optoisolator or optocoupler?

A. A lens and a photomultiplier

B. A frequency modulated helium-neon laser

C. An amplitude modulated helium-neon laser

D. An LED and a phototransistor

E6F03 ECLM Page (5 - 16)

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(D) E6F03 ECLM Page (5 - 16)

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 exposed to light\

E6F04 ECLM Page (5 - 17)

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(B) E6F04 ECLM Page (5 - 17)

Which describes an optical shaft encoder?

A. A device that detects rotation of a control by interrupting a light source with a patterned wheel

B. A device that measures the strength of a beam of light using analog to digital conversion

C. A digital encryption device often used to encrypt spacecraft control signals

D. A device for generating RTTY signals by means of a rotating light source.

E6F05 ECLM Page (5 - 16)

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(A) E6F05 ECLM Page (5 - 16)

Which of these materials is most commonly used to create photoconductive devices?

A. A crystalline semiconductor

B. An ordinary metal

C. A heavy metal

D. A liquid semiconductor

E6F06 ECLM Page (5 - 15)

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(A) E6F06 ECLM Page (5 - 15)

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 semiconductor passive delay line

E6F07 ECLM Page (5 - 16)

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(B) E6F07 ECLM Page (5 - 16)

Why are optoisolators often used in conjunction with solid state circuits when switching 120 VAC?

A. Optoisolators provide a low impedance link between a control circuit and a power circuit

B. Optoisolators provide impedance matching between the control circuit and power circuit

C. Optoisolators provide a very high degree of electrical isolation between a control circuit and the circuit being switched

D. Optoisolators eliminate the effects of reflected light in the control circuit

E6F08 ECLM Page (5 - 16)

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(C) E6F08 ECLM Page (5 - 16)

What is the efficiency of a photovoltaic cell?

A. The output RF power divided by the input DC power

B. Cost per kilowatt-hour generated

C. The open-circuit voltage divided by the short-circuit current under full illumination

D. The relative fraction of light that is converted to current

E6F09 ECLM Page (5 - 18)

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(D) E6F09 ECLM Page (5 - 18)

What is the most common type of photovoltaic cell used for electrical power generation?

A. Selenium

B. Silicon

C. Cadmium Sulfide

D. Copper oxide

E6F10 ECLM Page (5 - 17)

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B. Silicon

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(B) E6F10 ECLM Page (5 - 17)

What is the approximate open-circuit voltage produced by a fully-illuminated silicon photovoltaic cell?

A. 0.1 V

B. 0.5 V

C. 1.5 V

D. 12 V

E6F11 ECLM Page (5 - 17)

What is the approximate open-circuit voltage produced by a fully-illuminated silicon photovoltaic cell?

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(B) E6F11 ECLM Page (5 - 17)