**Chapter 1 - Advanced Theory**

**1.1 Time Constant**

A-001-001-001 **(D)**

What is the meaning of the term "time constant" in an RL circuit ?

A The time required for the voltage in the circuit to build up to 63.2% of the maximum value

B The time required for the voltage in the circuit to build up to 36.8% of the maximum value

C The time required for the current in the circuit to build up to 36.8% of the maximum value

D The time required for the current in the circuit to build up to 63.2% of the maximum value

A-001-001-002 **(D)**

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

A An exponential rate of one

B One exponential period

C A time factor of one

D One time constant

A-001-001-003 **(B)**

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 One exponential rate

B One time constant

C A time factor of one

D An exponential period of one

A-001-001-004 **(C)**

What is the term for the time it takes for a charged capacitor in an RC circuit to discharge to 36.8% of its initial value of stored charge?

A An exponential discharge of one

B One discharge period

C One time constant

D A discharge factor of one

A-001-001-005 **(B)**

What is meant by "back EMF"?

A A current equal to the applied EMF

B A voltage that opposes the applied EMF

C A current that opposes the applied EMF

D An opposing EMF equal to R times C percent of the applied EMF

A-001-001-006 **(D)**

After two time constants, the capacitor in an RC circuit is charged to what percentage of the supply voltage?

A 95%

B 36.8%

C 63.2%

D 86.5%

A-001-001-007 **(C)**

After two time constants, the capacitor in an RC circuit is discharged to what percentage of the starting voltage?

A 63.2%

B 36.8%

C 13.5%

D 86.5%

A-001-001-008 **(A)**

What is the time constant of a circuit having a 100 microfarad capacitor in series with a 470 kilohm resistor?

A 47 seconds

B 4700 seconds

C 470 seconds

D 0.47 seconds

A-001-001-009 **(B)**

What is the time constant of a circuit having a 470 microfarad capacitor in series with a 470 kilohm resistor?

A 47 000 seconds

B 221 seconds

C 221 000 seconds

D 470 seconds

A-001-001-010 **(C)**

What is the time constant of a circuit having a 220 microfarad capacitor in series with a 470 kilohm resistor?

A 470 seconds

B 470 000 seconds

C 103 seconds

D 220 seconds

**1.2 Electrostatic and Electromagnetic Fields**

A-001-002-001 **(A)**

What is the result of skin effect?

A As frequency increases, RF current flows in a thinner layer of the conductor, closer to the surface

B Thermal effects on the surface of the conductor decrease impedance

C Thermal effects on the surface of the conductor increase impedance

D As frequency decreases, RF current flows in a thinner layer of the conductor, closer to the surface

A-001-002-002 **(B)**

What effect causes most of an RF current to flow along the surface of a conductor?

A Piezoelectric effect

B Skin effect

C Layer effect

D Resonance effect

A-001-002-003 **(C)**

Where does almost all RF current flow in a conductor?

A In a magnetic field in the centre of the conductor

B In the centre of the conductor

C Along the surface of the conductor

D In a magnetic field around the conductor

A-001-002-004 **(A)**

Why does most of an RF current flow within a very thin layer under the conductor's surface?

A Because of skin effect

B Because a conductor has AC resistance due to self-inductance

C Because the RF resistance of a conductor is much less than the DC resistance

D Because of heating of the conductor's interior

A-001-002-005 **(A)**

Why is the resistance of a conductor different for RF currents than for direct currents?

A Because of skin effect

B Because the insulation conducts current at high frequencies

C Because of the Hertzberg effect

D Because conductors are non-linear devices

A-001-002-006 **(D)**

What unit measures the ability of a capacitor to store electrical charge?

A Coulomb

B Watt

C Volt

D Farad

A-001-002-007 **(C)**

A wire has a current passing through it. Surrounding this wire there is:

A an electrostatic field

B a cloud of electrons

C an electromagnetic field

D a skin effect that diminishes with distance

A-001-002-008 **(A)**

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

A In the direction determined by the left-hand rule

B In the same direction as the current

C In all directions

D In the direct opposite to the current

A-001-002-009 **(B)**

What is the term for energy that is stored in an electromagnetic or electrostatic field?

A Kinetic energy

B Potential energy

C Ampere-joules

D Joule-coulombs

A-001-002-010 **(A)**

Between the charged plates of a capacitor there is:

A an electrostatic field

B a magnetic field

C a cloud of electrons

D an electric current

A-001-002-011 **(B)**

Energy is stored within an inductor that is carrying a current. The amount of energy depends on this current, but it also depends on a property of the inductor. This property has the following unit:

A coulomb

B henry

C farad

D watt

**1.3 Series Resonance**

A-001-003-001 **(C)**

What is the resonant frequency of a series RLC circuit if R is 47 ohms, L is 50 microhenrys and C is 40 picofarads?

A 79.6 MHz

B 7.96 MHz

C 3.56 MHz

D 1.78 MHz

A-001-003-002 **(C)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 40 microhenrys and C is 200 picofarads?

A 1.99 kHz

B 1.99 MHz

C 1.78 MHz

D 1.78 kHz

A-001-003-003 **(A)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 50 microhenrys and C is 10 picofarads?

A 7.12 MHz

B 3.18 MHz

C 7.12 kHz

D 3.18 kHz

A-001-003-004 **(A)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 25 microhenrys and C is 10 picofarads?

A 10.1 MHz

B 63.7 kHz

C 63.7 MHz

D 10.1 kHz

A-001-003-005 **(B)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 3 microhenrys and C is 40 picofarads?

A 14.5 kHz

B 14.5 MHz

C 13.1 kHz

D 13.1 MHz

A-001-003-006 **(C)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 4 microhenrys and C is 20 picofarads?

A 19.9 MHz

B 19.9 kHz

C 17.8 MHz

D 17.8 kHz

A-001-003-007 **(D)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 8 microhenrys and C is 7 picofarads?

A 2.84 MHz

B 28.4 MHz

C 2.13 MHz

D 21.3 MHz

A-001-003-008 **(A)**

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

A-001-003-009 **(B)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 4 microhenrys and C is 8 picofarads?

A 49.7 MHz

B 28.1 MHz

C 49.7 kHz

D 28.1 kHz

A-001-003-010 **(C)**

What is the resonant frequency of a series RLC circuit, if R is 47 ohms, L is 1 microhenry and C is 9 picofarads?

A 17.7 MHz

B 1.77 MHz

C 53.1 MHz

D 5.31 MHz

A-001-003-011 **(A)**

What is the value of capacitance (C) in a series R-L-C circuit, if the circuit resonant frequency is 14.25 MHz and L is 2.84 microhenrys?

A 44 picofarads

B 2.2 microfarads

C 2.2 picofarads

D 44 microfarads

**1.4 Parallel Resonance**

A-001-004-001 **(C)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 1 microhenry and C is 10 picofarads?

A 50.3 kHz

B 15.9 MHz

C 50.3 MHz

D 15.9 kHz

A-001-004-002 **(D)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 2 microhenrys and C is 15 picofarads?

A 5.31 kHz

B 29.1 kHz

C 5.31 MHz

D 29.1 MHz

A-001-004-003 **(C)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 5 microhenrys and C is 9 picofarads?

A 23.7 kHz

B 3.54 MHz

C 23.7 MHz

D 3.54 kHz

A-001-004-004 **(A)**

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 2.65 MHz

C 2.65 kHz

D 20.5 kHz

A-001-004-005 **(C)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 15 microhenrys and C is 5 picofarads?

A 2.12 kHz

B 2.12 MHz

C 18.4 MHz

D 18.4 kHz

A-001-004-006 **(B)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 3 microhenrys and C is 40 picofarads?

A 1.33 kHz

B 14.5 MHz

C 1.33 MHz

D 14.5 kHz

A-001-004-007 **(D)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 40 microhenrys and C is 6 picofarads?

A 6.63 kHz

B 10.3 kHz

C 6.63 MHz

D 10.3 MHz

A-001-004-008 **(A)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 10 microhenrys and C is 50 picofarads?

A 7.12 MHz

B 7.12 kHz

C 3.18 kHz

D 3.18 MHz

A-001-004-009 **(A)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 200 microhenrys and C is 10 picofarads?

A 3.56 MHz

B 7.96 kHz

C 7.96 MHz

D 3.56 kHz

A-001-004-010 **(C)**

What is the resonant frequency of a parallel RLC circuit if R is 4.7 kilohms, L is 90 microhenrys and C is 100 picofarads?

A 1.77 MHz

B 1.77 kHz

C 1.68 MHz

D 1.68 kHz

A-001-004-011 **(B)**

What is the value of inductance (L) in a parallel RLC circuit, if the resonant frequency is 14.25 MHz and C is 44 picofarads?

A 253.8 millihenrys

B 2.8 microhenrys

C 3.9 millihenrys

D 0.353 microhenry

**1.5 Quality Factor**

A-001-005-001 **(C)**

What is the Q of a parallel RLC circuit, if it is resonant at 14.128 MHz, L is 2.7 microhenrys and R is 18 kilohms?

A 7.51

B 0.013

C 75.1

D 71.5

A-001-005-002 **(B)**

What is the Q of a parallel RLC circuit, if it is resonant at 14.128 MHz, L is 4.7 microhenrys and R is 18 kilohms?

A 13.3

B 43.1

C 4.31

D 0.023

A-001-005-003 **(B)**

What is the Q of a parallel RLC circuit, if it is resonant at 4.468 MHz, L is 47 microhenrys and R is 180 ohms?

A 0.00735

B 0.136

C 7.35

D 13.3

A-001-005-004 **(C)**

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 7.35

B 0.0319

C 31.9

D 71.5

A-001-005-005 **(C)**

What is the Q of a parallel RLC circuit, if it is resonant at 7.125 MHz, L is 8.2 microhenrys and R is 1 kilohm?

A 0.368

B 0.273

C 2.73

D 36.8

A-001-005-006 **(C)**

What is the Q of a parallel RLC circuit, if it is resonant at 7.125 MHz, L is 10.1 microhenrys and R is 100 ohms?

A 4.52

B 0.00452

C 0.221

D 22.1

A-001-005-007 **(A)**

What is the Q of a parallel RLC circuit, if it is resonant at 7.125 MHz, L is 12.6 microhenrys and R is 22 kilohms?

A 39

B 0.0256

C 25.6

D 22.1