

TEST ITEM FILE - CHAPTER 1 INTRODUCTORY TOPICS

1. A technique for resolving complex repetitive waveforms into sine or cosine waves and a dc component is known as:
- a. Harmonic Analysis
 - b. Armstrong's Principle
 - c. Fourier Analysis
 - d. Frequency Analysis

Answer: c

2. Shot noise is directly related to:
- a. dc current.
 - b. ac voltage.
 - c. resistor value.
 - d. boltzman constant.

Answer: a

3. The statement "information is proportional to bandwidth" is known as:
- a. Simpson Rule.
 - b. Shannon's Law.
 - c. Fourier's Law.
 - d. Hartley's Law.

Answer: d

4. Given that a filter has a Q of 50 and a BW of 500 Hz, determine its resonant or center frequency.
- a. 100 kHz
 - b. 25,000 kHz
 - c. 2500 kHz
 - d. 250 kHz

Answer: b

5. Determine the frequency of a Clapp oscillator if $L_4 = 35 \text{ mH}$ and $C_3 = 20 \text{ pf}$.
- a. 200 kHz
 - b. 20 kHz
 - c. 190 kHz
 - d. 1.9 MHz

Answer: c

6. The device which superimposes information onto a high-frequency signal for transmission is called:
- a. a demodulator.
 - b. the carrier.
 - c. a modulator.
 - d. the intelligence.

Answer: c

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7. A device that converts energy from one form to another is called a:
- a. transducer.
 - b. transmitter.
 - c. modulator.
 - d. detector.
- Answer: a
8. The device which extracts the information signal from the high frequency carrier in a receiver is called a:
- a. transducer.
 - b. transmitter.
 - c. modulator.
 - d. demodulator.
- Answer: d
9. Frequencies between 3 and 30 Mhz are referred to as:
- a. Ultra-High Frequencies (UHF').
 - b. High Frequencies (HF).
 - c. Very-High Frequencies (VHF').
 - d. Medium Frequencies (MF).
- Answer: b
10. Ultra-High Frequency signals are between:
- a. 30 Mhz and 300 MHz.
 - b. 3 Mhz and 30 GHz.
 - c. 3 Mhz and 30 MHz.
 - d. 300 Mhz and 3 GHz.
- Answer: d
11. The type of noise that is often produced by spark-producing equipment is known as:
- a. man-made noise.
 - b. atmospheric noise.
 - c. thermal noise.
 - d. transistor noise.
- Answer: a
12. Which is NOT an example of internal noise?
- a. Noise produced by resistors
 - b. Noise produced by transistors and integrated circuits
 - c. Excess noise
 - d. Space noise
- Answer: d

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13. Which is NOT a term for noise produced by resistors?
- a. White noise
 - b. Shot noise
 - c. Johnson noise
 - d. Thermal noise
- Answer: b
14. If the noise produced by a resistor in a radio receiver is 2.4 μV and the resistance is then doubled, the resulting noise produced by the new resistance is approximately:
- a. 3.4 μV .
 - b. 2.4 μV .
 - c. 1.2 μV .
 - d. 4.8 μV .
- Answer: a
15. Two types of noise that occur at extremely low and high frequencies in amplifiers containing transistors are known as:
- a. excess noise and transit-time noise.
 - b. flicker noise and shot noise.
 - c. $1/f$ noise and thermal noise.
 - d. Johnson noise and pink noise.
- Answer: a
16. A figure of merit that best describes how much noise a device creates is known as:
- a. signal-to-noise ratio.
 - b. Noise figure.
 - c. Friis noise.
 - d. effective noise bandwidth.
- Answer: b
17. A transistor amplifier has a measured S/N power of 25 at its input and 8 at its output. Its noise figure in decibels is:
- a. 118.
 - b. 17.
 - c. 9.10.
 - d. 4.95.
- Answer: d
18. A popular, convenient way of representing noise calculations, mainly involved with microwave receivers, is:
- a. SIN ratio.
 - b. Noise figure.
 - c. Equivalent noise temperature.
 - d. Equivalent noise resistance.
- Answer: c

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19. In a three-stage amplifier.
- a. the noise ratio of all three stages is mainly due to the noise figure of the first stage.
 - b. Friss's formula can be used to determine the overall noise effect of all three stages.
 - c. the noise ratio of the last stage is usually insignificant.
 - d. all of the above.

Answer: d

20. When using a noise diode generator in making noise measurements, the noise diode's current in ma. is numerically equal to the:
- a. noise ratio of the DUT no matter what its impedance is.
 - b. noise figure in db of the DUT no matter what its impedance is.
 - c. noise ratio of the DUT only if its impedance is 50 ohms.
 - d. noise figure in decibels of the DUT only if its impedance is 50 ohms.

Answer: c

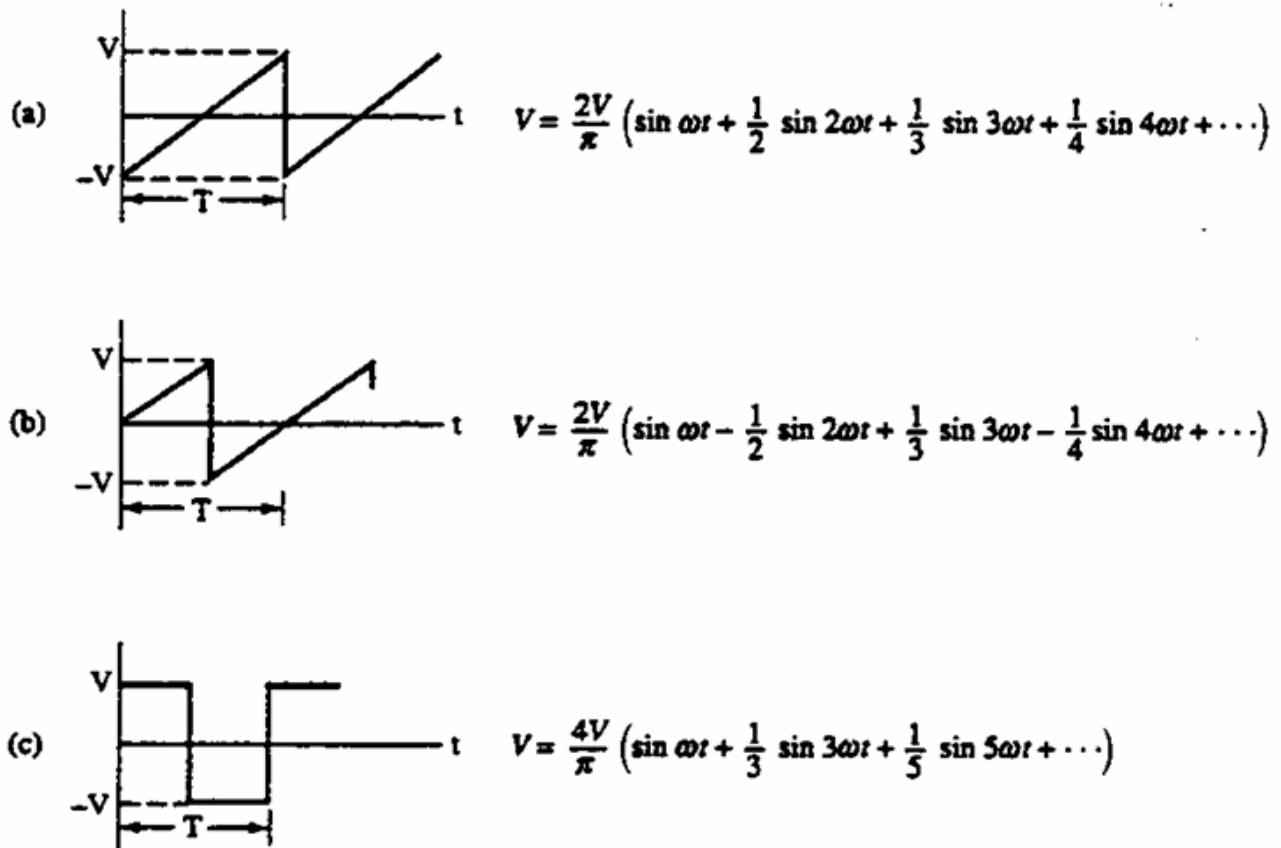
21. Hartley's law states that:
- a. bandwidth is directly proportional to both the amount of information and time of transmission.
 - b. the amount of information is directly proportional to both the system bandwidth and time of transmission.
 - c. the time of transmission is directly proportional to both the system bandwidth and the amount of information.
 - d. the bandwidth is directly proportional to both the amount of information and the amount of noise present.

Answer: b

22. A ramp waveform of the type shown in Figure 1-1a has a peak-to-peak amplitude of 2V and a frequency of 50 Hz. The term representing the fifth harmonic has a coefficient of
- a. 0.2
 - b. 2.5
 - c. 0.127
 - d. 0.254

Answer: c

Figure 1-1



23. A square wave of the type shown in Figure 1-1c has a peak-to-peak amplitude of 10V and a frequency of 200 Hz. The term representing the fifth harmonic is approximately:

- a. $1.27 \sin 6283t$
- b. $0.2 \sin 6283t$
- c. $4 \sin 3142t$
- d. $6.35 \sin 6283t$

Answer: a

24. A 4.7 mH inductor has a Q of 3500 at a frequency of 50 MHz. Its internal resistance is approximately:

- a. 422 ohms.
- b. 67.14 ohms.
- c. 14.9 milliohms.
- d. 2.37 milliohms.

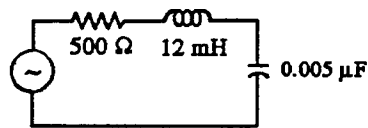
Answer: a

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25. The resonant frequency of the resonant circuit given in Figure 1-2 is:
- 129 kHz.
 - 41.1 kHz.
 - 20.6 kHz.
 - 2.65GHz.

Answer: c

Figure 1-2



26. The impedance of the resonant circuit given in Figure 1-2 is:

- 1553 ohms.
- 2053 ohms.
- 500 ohms.
- 1632 ohms.

Answer: c

27. The bandwidth of the resonant circuit given in Figure 1-2 is:

- 1.59×10^6 Hz.
- 2.4×10^6 Hz.
- 41.6×10^3 Hz.
- 6635 Hz.

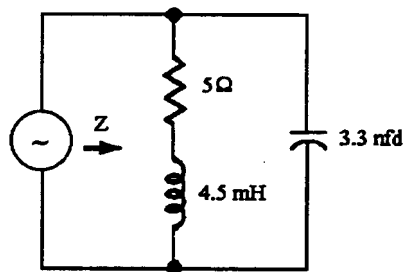
Answer: d

28. The parallel resonant circuit of Figure 1-3 has a resonant frequency of approximately:

- 259 kHz
- 10.7 GHz
- 41.3 kHz
- 82.6 kHz

Answer: c

Figure 1-3



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29. The parallel resonant circuit of Figure 1-3 has Q and BW equal to:

- a. 233 and 176. Hz, respectively
- b. 233 and 241 Hz, respectively
- c. 1111 and 37.2 Hz, respectively
- d. 171.2 and 241 Hz, respectively

Answer: a

30. The maximum impedance at the resonant frequency for the circuit of Figure 1-3 is approximately:

- a. 10.8 kilo-ohms
- b. 1.165 kilo-ohms
- c. 5.825 kilo-ohms
- d. 271.4 kilo-ohms

Answer: d

31. The oscillator design that is characterized by having a "tapped" inductor is the:

- a. Hartley design.
- b. Clapp design.
- c. Colpitts design.
- d. Crystal design.

Answer: a

32. The oscillator design that uses two capacitors in the tank circuit is the:

- a. Hartley design.
- b. Clapp design.
- c. Colpitts design.
- d. Crystal design.

Answer: c

33. The oscillator design that has the highest frequency stability is the:

- a. Hartley design.
- b. Clapp design.
- c. Colpitts design.
- d. Crystal design.

Answer: d

34. The main requirements that must be met for an oscillator to successfully oscillate are known as:

- a. the flywheel effect.
- b. Barkhausen criteria.
- c. the piezoelectric effect.
- d. frequency synthesis.

Answer: b

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35. The repetitive exchange of energy from the magnetic field of an inductor to an electric charge on a capacitor in a resonant circuit is known as:
- a. the flywheel effect.
 - b. Barkhausen criteria.
 - c. the piezoelectric effect.
 - d. frequency synthesis.

Answer: a

36. A measured value of 10mW will result in what dBm power level?

- a. 0dBm
- b. 3dBm
- c. 10dBm
- d. -3dBm

Answer: c

37. Determine the voltage level required to produce a +10dBm level. Assume a 600Ω system.

- a. 1.947V
- b. 2.45V
- c. .775V
- d. none of the above

Answer: b

38. Convert 300W to dBW.

- a. 54.77 dBW
- b. -24.77 dBW
- c. -10.0 dBW
- d. 24.77 dBW

Answer: d

39. A laser diode outputs +8 dBm. Convert this value to Watts.

- a. 0.0063W
- b. 0.063W
- c. 0.63W
- d. 0.00063W

Answer: a

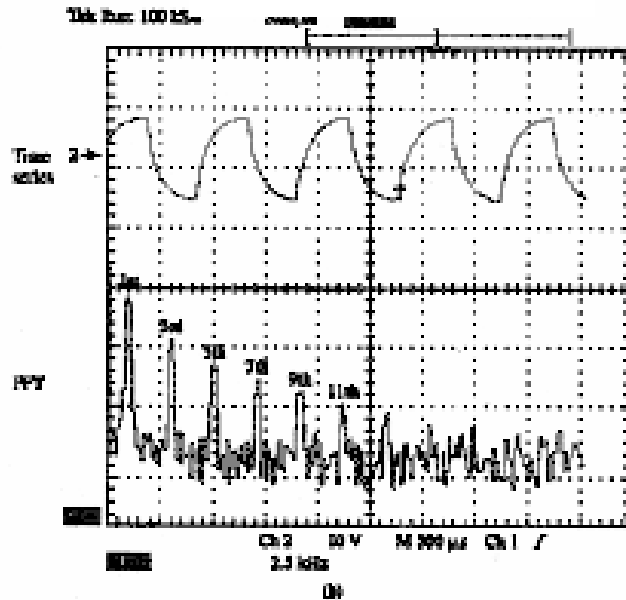
40. A square wave is made up of a summation of:

- a. ramps
- b. sinusoids
- c. rectangle waves
- d. pulses

Answer: b

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Figure 1-4



41. The time series and FFT waveforms shown in Figure 1-4 show what a square wave can look like when passed through:

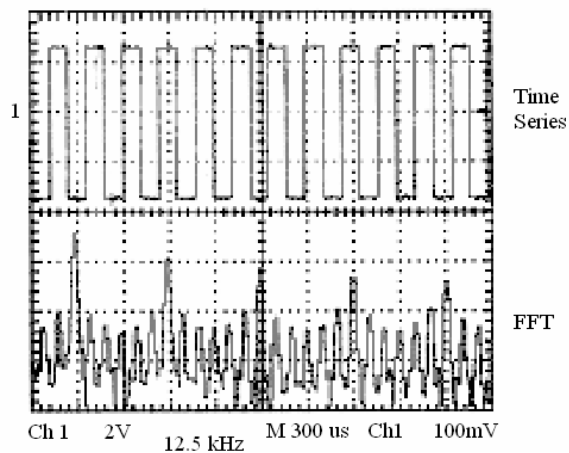
- rectifier circuit
- highpass filter
- bandstop filter
- a bandwidth limited channel

Answer: d

42. Figure 1-5 was obtained from a DSO. What are the frequencies of the third and fifth harmonics?

Figure 1-5

Tek Run: 500 kS/s



- 12.5 and 25kHz
- 37.5 and 62.5 kHz
- 10 and 20 kHz
- 30 and 50 kHz

Answer: b