

FCC Exam Element 3 Question Pool for General Class  
Effective **7/1/2019 – 6/30/2023**

**SUBELEMENT G7 – PRACTICAL CIRCUITS [3 Exam Questions – 3 Groups]**

G7A – Power supplies; schematic symbols

**G7A01**

**What useful feature does a power supply bleeder resistor provide?**

- A. It acts as a fuse for excess voltage
- B. It ensures that the filter capacitors are discharged when power is removed**
- C. It removes shock hazards from the induction coils
- D. It eliminates ground loop current

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**G7A02**

**Which of the following components are used in a power supply filter network?**

- A. Diodes
- B. Transformers and transducers
- C. Quartz crystals
- D. Capacitors and inductors**

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**G7A03**

**Which type of rectifier circuit uses two diodes and a center-tapped transformer?**

- A. Full-wave**
- B. Full-wave bridge
- C. Half-wave
- D. Synchronous

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**G7A04**

**What is an advantage of a half-wave rectifier in a power supply?**

- A. Only one diode is required**
- B. The ripple frequency is twice that of a full-wave rectifier
- C. More current can be drawn from the half-wave rectifier
- D. The output voltage is two times the peak output voltage of the transformer

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G7A05

**What portion of the AC cycle is converted to DC by a half-wave rectifier?**

- A. 90 degrees
- B. 180 degrees**
- C. 270 degrees
- D. 360 degrees

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G7A06

**What portion of the AC cycle is converted to DC by a full-wave rectifier?**

- A. 90 degrees
- B. 180 degrees
- C. 270 degrees
- D. 360 degrees**

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G7A07

**What is the output waveform of an unfiltered full-wave rectifier connected to a resistive load?**

- A. A series of DC pulses at twice the frequency of the AC input**
- B. A series of DC pulses at the same frequency as the AC input
- C. A sine wave at half the frequency of the AC input
- D. A steady DC voltage

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G7A08

**Which of the following is an advantage of a switchmode power supply as compared to a linear power supply?**

- A. Faster switching time makes higher output voltage possible
- B. Fewer circuit components are required
- C. High-frequency operation allows the use of smaller components**
- D. All these choices are correct

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G7A09

**Which symbol in figure G7-1 represents a field effect transistor?**

- A. Symbol 2
- B. Symbol 5
- C. Symbol 1**
- D. Symbol 4

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G7A10

**Which symbol in figure G7-1 represents a Zener diode?**

- A. Symbol 4
- B. Symbol 1
- C. Symbol 11
- D. Symbol 5**

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G7A11

**Which symbol in figure G7-1 represents an NPN junction transistor?**

- A. Symbol 1
- B. Symbol 2**
- C. Symbol 7
- D. Symbol 11

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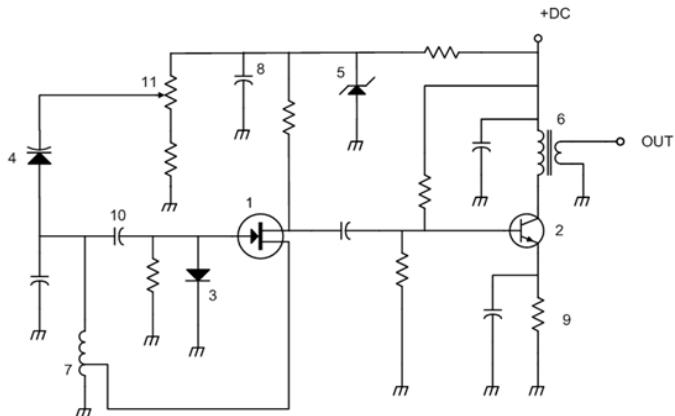


Figure G7-1

G7A12

**Which symbol in Figure G7-1 represents a solid core transformer?**

- A. Symbol 4
- B. Symbol 7
- C. Symbol 6**
- D. Symbol 1

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G7A13

**Which symbol in Figure G7-1 represents a tapped inductor?**

- A. Symbol 7**
- B. Symbol 11
- C. Symbol 6
- D. Symbol 1

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G7B – Digital circuits; amplifiers and oscillators

G7B01

**What is the reason for neutralizing the final amplifier stage of a transmitter?**

- A. To limit the modulation index
- B. To eliminate self-oscillations**
- C. To cut off the final amplifier during standby periods
- D. To keep the carrier on frequency

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G7B02

**Which of these classes of amplifiers has the highest efficiency?**

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

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G7B03

**Which of the following describes the function of a two-input AND gate?**

- A. Output is high when either or both inputs are low
- B. Output is high only when both inputs are high**
- C. Output is low when either or both inputs are high
- D. Output is low only when both inputs are high

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G7B04

**Which of the following describes the function of a two input NOR gate?**

- A. Output is high when either or both inputs are low
- B. Output is high only when both inputs are high
- C. Output is low when either or both inputs are high**
- D. Output is low only when both inputs are high

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G7B05

**How many states does a 3-bit binary counter have?**

- A. 3
- B. 6
- C. 8**
- D. 16

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G7B06

**What is a shift register?**

- A. A clocked array of circuits that passes data in steps along the array**
- B. An array of operational amplifiers used for tri-state arithmetic operations
- C. A digital mixer
- D. An analog mixer

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G7B07

**Which of the following are basic components of a sine wave oscillator?**

- A. An amplifier and a divider
- B. A frequency multiplier and a mixer
- C. A circulator and a filter operating in a feed-forward loop
- D. A filter and an amplifier operating in a feedback loop**

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G7B08

**How is the efficiency of an RF power amplifier determined?**

- A. Divide the DC input power by the DC output power
- B. Divide the RF output power by the DC input power**
- C. Multiply the RF input power by the reciprocal of the RF output power
- D. Add the RF input power to the DC output power

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G7B09

**What determines the frequency of an LC oscillator?**

- A. The number of stages in the counter
- B. The number of stages in the divider
- C. The inductance and capacitance in the tank circuit**
- D. The time delay of the lag circuit

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G7B10

**Which of the following describes a linear amplifier?**

- A. Any RF power amplifier used in conjunction with an amateur transceiver
- B. An amplifier in which the output preserves the input waveform**
- C. A Class C high efficiency amplifier
- D. An amplifier used as a frequency multiplier

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G7B11

**For which of the following modes is a Class C power stage appropriate for amplifying a modulated signal?**

- A. SSB
- B. FM**
- C. AM
- D. All these choices are correct

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G7C – Receivers and transmitters; filters; oscillators

G7C01

**Which of the following is used to process signals from the balanced modulator then send them to the mixer in some single sideband phone transmitters?**

- A. Carrier oscillator
- B. Filter**
- C. IF amplifier
- D. RF amplifier

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G7C02

**Which circuit is used to combine signals from the carrier oscillator and speech amplifier then send the result to the filter in some single sideband phone transmitters?**

- A. Discriminator
- B. Detector
- C. IF amplifier
- D. Balanced modulator**

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G7C03

**What circuit is used to process signals from the RF amplifier and local oscillator then send the result to the IF filter in a superheterodyne receiver?**

- A. Balanced modulator
- B. IF amplifier
- C. Mixer**
- D. Detector

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G7C04

**What circuit is used to combine signals from the IF amplifier and BFO and send the result to the AF amplifier in some single sideband receivers?**

- A. RF oscillator
- B. IF filter
- C. Balanced modulator
- D. Product detector**

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G7C05

**Which of the following is an advantage of a direct digital synthesizer (DDS)?**

- A. Wide tuning range and no need for band switching
- B. Relatively high-power output
- C. Relatively low power consumption
- D. Variable frequency with the stability of a crystal oscillator**

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G7C06

**What should be the impedance of a low-pass filter as compared to the impedance of the transmission line into which it is inserted?**

- A. Substantially higher
- B. About the same**
- C. Substantially lower
- D. Twice the transmission line impedance

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G7C07

**What is the simplest combination of stages that implement a superheterodyne receiver?**

- A. RF amplifier, detector, audio amplifier
- B. RF amplifier, mixer, IF discriminator
- C. HF oscillator, mixer, detector**
- D. HF oscillator, prescaler, audio amplifier

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G7C08

**What circuit is used in analog FM receivers to convert IF output signals to audio?**

- A. Product detector
- B. Phase inverter
- C. Mixer
- D. Discriminator**

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G7C09

**What is the phase difference between the I and Q signals that software-defined radio (SDR) equipment uses for modulation and demodulation?**

- A. Zero
- B. 90 degrees**
- C. 180 degrees
- D. 45 degrees

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G7C10

**What is an advantage of using I and Q signals in software-defined radios (SDRs)?**

- A. The need for high resolution analog-to-digital converters is eliminated
- B. All types of modulation can be created with appropriate processing**
- C. Minimum detectable signal level is reduced
- D. Converting the signal from digital to analog creates mixing products

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G7C11

**What is meant by the term “software-defined radio” (SDR)?**

- A. A radio in which most major signal processing functions are performed by software**
- B. A radio that provides computer interface for automatic logging of band and frequency
- C. A radio that uses crystal filters designed using software
- D. A computer model that can simulate performance of a radio to aid in the design process

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G7C12

**What is the frequency above which a low-pass filter’s output power is less than half the input power?**

- A. Notch frequency
- B. Neper frequency
- C. Cutoff frequency**
- D. Rolloff frequency

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G7C13

**What term specifies a filter’s maximum ability to reject signals outside its passband?**

- A. Notch depth
- B. Rolloff
- C. Insertion loss
- D. Ultimate rejection**

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G7C14

**The bandwidth of a band-pass filter is measured between what two frequencies?**

- A. Upper and lower half-power**
- B. Cutoff and rolloff
- C. Pole and zero
- D. Image and harmonic

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G7C15

**What term specifies a filter's attenuation inside its passband?**

- A. Insertion loss
- B. Return loss
- C. Q
- D. Ultimate rejection

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G7C16

**Which of the following is a typical application for a Direct Digital Synthesizer?**

- A. A high-stability variable frequency oscillator in a transceiver
- B. A digital voltmeter
- C. A digital mode interface between a computer and a transceiver
- D. A high-sensitivity radio direction finder

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