

# Gordon West's Pre-Study Q&A for the 2012-16 Extra Class Course

**W**elcome to your EXTRA CLASS Element 4 pre-study homework. Your upcoming license exam preparation class will take your textbook questions and answers and relate them to the real world of ham radio operating, as an upgrade from General Class to EXTRA CLASS!

This pre-study Q&A assignment is straight out of our Gordon West Extra Class book, valid July 2012 through June 2016. The fill in the blank questions in this pre-study guide follow the exact order of the Gordon West book. Questions have been rearranged for easier concept learning, and we even give you page numbers and audio CD references to quickly spot the correct answer.

We also reference technical questions that are detailed in the *Basic Electronics* book, which may be part of your course or ordered directly from the distributor 1 800 669 9594 (developed and published by Master Publishing, Inc., McWhorter and Evans)

You can also take practice exams using The W5YI Group HamStudy computer software specifically developed to go along with my book.

This pre-study homework is fill-in-the-blank. Your actual Element 4 written examination will be multiple choice – all the easier.

Begin reading over your *Extra Class* book and start filling in the home study answers. Also consult *Basic Electronics* (which we will abbreviate BE), and we give you page numbers to find the answers. Be sure to bring your completed home study notes to the first class session.

Good luck with your study! I hope to hear you on the Extra Class airwaves very soon!!

***Gordon West***  
WB6NOA

To order the Gordon West *Extra Class* book, go to  
[www.w5yi.org](http://www.w5yi.org)  
or call 1-800-669-9594

## EXTRA CLASS PRIVILEGES (pages 1 - 8)

1. **X** refers to the Gordon West *Extra Class* book. **BE** refers to the optional *Basic Electronics* book.  
Got both? \_\_\_\_\_
2. On which bands do you gain 25 kHz window of exclusive CW privileges at the bottom of each band?  
\_\_\_\_\_
3. When you get to Extra, you gain \_\_\_\_\_ kHz of additional voice and data privileges?
4. On 75 meters, your Extra Class voice privileges, not shared with other operators, are from \_\_\_\_\_ MHz to \_\_\_\_\_ MHz?
5. On the popular 20 meter band, Extras have non-shared voice privileges from \_\_\_\_\_ MHz to \_\_\_\_\_ MHz.
6. As an Extra Class operator, you may test for all levels as a V \_\_\_\_\_  
E \_\_\_\_\_.

## HAM RADIO HISTORY (pages 9 -14)

1. How many hams in the U S A? \_\_\_\_\_
2. How old is the amateur radio service? \_\_\_\_\_
3. In 1979, what test was eliminated for operation above 30 MHz? \_\_\_\_\_
4. In 2007, what test requirement was eliminated for high frequency licensing?  
\_\_\_\_\_
5. When did Volunteer testing begin? \_\_\_\_\_
6. Which test element is Element 2? \_\_\_\_\_
7. Which element is Element 3? \_\_\_\_\_
8. Which element is Element 4? \_\_\_\_\_
9. May an applicant go from Technician to Extra without taking the General Element?  
\_\_\_\_\_

## GETTING READY FOR THE EXAM (pages 15 - 20)

1. How many test questions are on upcoming Extra Class Element 4 exam? \_\_\_\_\_
2. Answer \_\_\_\_\_ or more correctly, and you pass!
3. Confirm: Is your General Class license is current? \_\_\_\_\_
4. Important: When you pass your Extra Class exam, the license term still remains the same – you DON'T automatically get 10 more years before renewal. Check your General license renewal date. This is when your new Extra Class renewal is due. Luckily, no re-test is required!

## GETTING READY FOR THE EXAM (continued)

5. What does Extra subelement E9 cover? \_\_\_\_\_
6. After my rearrangement of topics, how many topic areas are there? \_\_\_\_\_
7. OK, I scrambled the question numbers – where will you find the cross reference?  
p \_\_\_\_\_ to p \_\_\_\_\_? Hint: back of the book!
8. If you haven't already, its time to play the audio CD in the front of the book. Did you play it?  
\_\_\_\_\_

## RULES AND REGULATIONS (p 21 - p 38)

1. When operating USB, how close to the top of the band may you operate? \_\_\_\_\_
2. How much power output on 60 meters? \_\_\_\_\_
3. How much power output on 30 meters code and data band? \_\_\_\_\_
4. With an Extra ticket, you gain authority in most \_\_\_\_\_ countries.
5. Where is line A restriction for portions of 70 cm? \_\_\_\_\_
6. What type of control for a common repeater up on a mountainside? \_\_\_\_\_
7. Where may repeater operation take place on 10 meters? \_\_\_\_\_
8. Minimum age limit to become a Volunteer Examiner? \_\_\_\_\_
9. What is issued to an examinee after passing a test element? \_\_\_\_\_
10. Fraudulent exam results might cost a VE team their own \_\_\_\_\_?

## PROPAGATION (p 39 - 54) BE (p 108 -119) Take the quiz for extra credit!

1. What are the two fields in an electromagnetic wave? \_\_\_\_\_
2. What is the polarization of an antenna whose ELECTRIC field is perpendicular to the surface of the earth? \_\_\_\_\_
3. Which ham band provides great DX for nearly 24 hours? \_\_\_\_\_
4. Twilight conditions between two distant stations may lead to fantastic DX, called \_\_\_\_\_ propagation?
5. Best band for a meteor scatter contact? \_\_\_\_\_
6. What's that "horn" you see in the sun photo on p 47? \_\_\_\_\_
7. A VHF/UHF contact, sometimes lasting for days between stations separated 2000 miles over the ocean is called \_\_\_\_\_?
8. You tune in on a DX station on 14.120, who indicates they are listening "up 35". Where should YOU transmit? \_\_\_\_\_

## **SATELLITE AND SPACE COMMUNICATIONS (p 55 - 66)**

1. Which class of amateur license allows satellite communication? \_\_\_\_\_
2. What band do you receive on for satellite mode V/U? \_\_\_\_\_
3. Why does a satellite signal tune in higher as it is coming up toward you from the horizon?  
\_\_\_\_\_
4. What type of satellite appears in one steady position in the sky? \_\_\_\_\_
5. Where might you find CW and data moon bounce communications on 2 meters?  
\_\_\_\_\_
6. The best time to complete a moon bounce contact is when the moon is at  
\_\_\_\_\_?

## **VISUAL AND VIDEO (p 67 - 76)**

1. Amateurs still use analog ham radio TV transmissions. What is the name of the video signal that carries color information? \_\_\_\_\_
2. Ham analog video fast scan TV is wide! - \_\_\_\_\_MHz . Where on high frequency is a reserved spot for slow scan television? \_\_\_\_\_MHz
3. On older oscilloscopes, if we exceed \_\_\_\_\_ we could cause the cathode ray tube to generate X-rays.
4. What is the big benefit of a liquid crystal display? \_\_\_\_\_

## **DIGITAL (p 77 - 88) BE (p121 - 133) Take the quiz for extra credit!**

1. What digital mode is common below 30 MHz? \_\_\_\_\_
2. Which digital mode to transfer binary files? \_\_\_\_\_
3. What is the formula to determine digital band width? \_\_\_\_\_
4. Watch this level when adjusting PSK31? \_\_\_\_\_
5. How might we send our position over the air? \_\_\_\_\_
6. What is the common 2 meter frequency for sending digital position bursts?  
\_\_\_\_\_
7. Spread spectrum transmissions are allowed above \_\_\_\_\_MHZ?
8. What is the maximum transmitter power for spread spectrum? \_\_\_\_\_watts
9. What is the formula for calculating CW band width? \_\_\_\_\_  
\_\_\_\_\_

**MODULATION (p 89 -108) BE (p115 - 117) try the quiz on p 119**

1. What is the formula for modulation index?  
\_\_\_\_\_
2. What is the formula for deviation ratio?  
\_\_\_\_\_
3. What type of wave consists of a sine wave plus all ODD harmonics? \_\_\_\_\_ wave
4. What influences power output measured on your SSB peak reading watt meter? \_\_\_\_\_ characteristics
5. What is RMS voltage on your wall socket? \_\_\_\_\_
6. What would be the Peak voltage on your wall socket? \_\_\_\_\_
7. What stage can generate an FM phone emission? \_\_\_\_\_
8. How might we generate an SSB phone signal? \_\_\_\_\_
9. What does DSP stand for? \_\_\_\_\_
10. Which components in the upper arm of a filter will create low-pass?  
\_\_\_\_\_
11. Which components in the upper arm of a filter will create high-pass?  
\_\_\_\_\_
12. What is it called when too close proximity repeaters have signal mixes and create unwanted interference?  
\_\_\_\_\_
13. What are those large cans seen at repeater sites? \_\_\_\_\_

**AMPLIFIERS & POWER SUPPLIES (p109 - 120) BE (p87 - 88, p17 -26)**

1. Which amplifier class offers best linearity with least distortion? \_\_\_\_\_
2. Which amplifier type eliminates even-order harmonics? \_\_\_\_\_
3. Which amplifier type offers best efficiency, but poor linearity? \_\_\_\_\_
4. What is the process for preventing unwanted oscillations in a power amplifier?  
\_\_\_\_\_
5. What devices do we find at UHF for power amplifier applications?  
\_\_\_\_\_
6. What device is used as a stable reference voltage in a linear voltage regulator?  
\_\_\_\_\_

## AMPLIFIERS & POWER SUPPLIES (continued)

7. What circuit is shown in figure E7-3? \_\_\_\_\_
8. What is the purpose of a bleeder resistor? \_\_\_\_\_
9. Watch out for this component – it can store a LETHAL voltage, even after the circuit is turned off?  
\_\_\_\_\_

## RECEIVERS & FILTERS (p121 - 138)

1. Which component in your radio develops the piezoelectric effect?  
\_\_\_\_\_
2. Which filter has no ripple and good attenuation beyond the passband?  
\_\_\_\_\_
3. The rearranged formula for determining intermodulation interference, frequency 2?  
\_\_\_\_\_
4. Is -174 dBm great or fair for receiver sensitivity? \_\_\_\_\_
5. You SSB voice filter network has this selectivity or greater? \_\_\_\_\_ kHz
6. Where is most of the noise coming from over your high frequency station antenna system?  
\_\_\_\_\_
7. What device provides rectification and filtering of RF signals?  
\_\_\_\_\_
8. What occurs within the mixer circuit if you introduce excessive pre-amplification?  
\_\_\_\_\_
9. Noise blankers are good for eliminating this type of interference?  
\_\_\_\_\_
10. What does DSP stand for?  
\_\_\_\_\_

## OSCILLATORS & SYNTHESIZERS (p139-148) BE (p98-100, 153-174 TOPICAL REFERENCE)

1. The oscillator that uses a quartz crystal? \_\_\_\_\_
2. Common oscillator for VFOs? \_\_\_\_\_
3. What does PLL stand for? \_\_\_\_\_
4. What does DDS stand for? \_\_\_\_\_
5. What are the unwanted components of DDS? \_\_\_\_\_

## RESONANCE - Don't Panic! (p149-181) BE (p54)

E = voltage L = inductance in a coil I = current C = capacitive reactance in a capacitor

1. In an ELI circuit, is it voltage or current LEADING? \_\_\_\_\_
2. In an ICE circuit, does current LEAD or LAG? \_\_\_\_\_
3. When working phase angle questions on the test, most correct answers start off with \_\_\_\_\_ degrees?
4. A (+j) reactance is inductive or capacitive? \_\_\_\_\_
5. A circuit (-j) is capacitive or reactive? \_\_\_\_\_
6. What coordinate system may display the phase angle of circuits containing resistance, inductance and/or capacitive reactance? \_\_\_\_\_
7. In polar coordinates, when inductive reactance cancels capacitive reactance, leading only to resistance in series, what is the phase angle? \_\_\_\_\_ degrees?
8. Formula to determine half-power bandwidth?  
\_\_\_\_\_
9. In a time constant circuit, how many time constants for a capacitor to be charged 63.2 per cent of the supply voltage? \_\_\_\_\_ time constants
10. What page in the Gordo book allows you to visualize time constants? \_\_\_\_\_
11. As frequencies increase, RF current flows in a thinner layer of the conductor, close to the surface. What is this called? \_\_\_\_\_
12. What is the term for out-of-phase non-productive power within a coil or capacitor?  
\_\_\_\_\_
13. Formula for computing true power? \_\_\_\_\_
14. Advantage of a toroidal core inductor? \_\_\_\_\_

## COMPONENTS (p 183- 193) BE (p 59 -84 topically) For extra credit, complete the quiz for Chapter 4 BE

1. Draw a PNP transistor. \_\_\_\_\_
2. Draw an N-channel dual gate mosfet \_\_\_\_\_
3. What diode amplifies and oscillates? \_\_\_\_\_
4. Draw a varactor diode \_\_\_\_\_
5. Input voltage to a logic "low" in an old TTL device? \_\_\_\_\_
6. What is a MMIC? \_\_\_\_\_
7. MMIC devices require \_\_\_\_\_ volts?

## DIGITAL LOGIC & OPTOS (p195 - 212)

BE (p121 - 150, p193 - 206 topically)

(Complete quiz for Chapter 11 for extra credit!)

1. Draw the symbol for an AND gate \_\_\_\_\_
2. You can spot an OR gate symbol by a \_\_\_\_\_ on its nose.
3. A list of inputs and corresponding outputs for a digital device is called a \_\_\_\_\_.
4. This provides receiver calibration \_\_\_\_\_?
5. What does OP-AMP stand for? \_\_\_\_\_
6. Formula for the gain of an inverting IC OP-AMP? \_\_\_\_\_
7. Typical output impedance of an integrated circuit OP-AMP? \_\_\_\_\_
8. The tuning shaft and LED shine through this device? \_\_\_\_\_
9. What absorbs energy when light shines on a photovoltaic cell? \_\_\_\_\_

## TEST EQUIPMENT (p213 -218)

1. This instrument shows frequencies on the horizontal axis \_\_\_\_\_
2. This instrument indicates pulses in a digital logic circuit. \_\_\_\_\_
3. This instrument measures frequencies. \_\_\_\_\_
4. An increase in current on an RF ammeter in series with the antenna feedline indicates less or more current to the antenna? \_\_\_\_\_
5. What type of meter shows a traditional needle movement? \_\_\_\_\_

## ANTENNAS (p219 - 236)

1. Do you want maximum or minimum radiation resistance of an antenna?  
\_\_\_\_\_
2. What's missing on an HF quarter wave antenna? \_\_\_\_\_
3. What provides the best RF ground to Earth? \_\_\_\_\_
4. What provides the best RF ground aboard a sailboat? \_\_\_\_\_
5. What is the approximate feedpoint impedance of a half wave dipole? \_\_\_\_\_
6. What is the approximate feedpoint impedance of a folded dipole? \_\_\_\_\_

## ANTENNAS (continued)

7. What antenna has no gain in any direction? \_\_\_\_\_
8. To improve radiation efficiency of a mobile antenna, add a \_\_\_\_\_ to increase top loading?
9. What antenna might produce patterns seen on page 229? \_\_\_\_\_
10. Increasing the boom length does what for a Yagi antenna? \_\_\_\_\_

## SAFETY (p 237 - 260)

1. What is one type of matching network to a Yagi antenna? \_\_\_\_\_
2. What instrument allows you to test antenna resonance? \_\_\_\_\_
3. What is the typical velocity factor of coax cable with a solid polyethylene dielectric?  
\_\_\_\_\_
4. P. 245, that little bird is sitting on which element of my stacked two meter Yagi?  
\_\_\_\_\_
5. Which chart allows you to calculate impedance along transmission lines?  
\_\_\_\_\_
6. Why don't we see more rhombics in downtown neighborhoods?  
\_\_\_\_\_
7. The bigger the dish, beamwidth \_\_\_\_\_?
8. What does SAR measure? \_\_\_\_\_
9. What type of direction finding requires multiple bearings at multiple locations?  
\_\_\_\_\_

[END]