Test 2 Review

Definitions & Theory behind:

* AIS
  + What vessels are required to carry AIS
  + Range of AIS Frequency – Sent over Radio Frequencies so follow same principles
  + Components of an AIS
  + USES and Capabilities
  + Different Data Types (Fixed, Voyage, Dynamic)
    - What types of information fall under each Data Type
  + Frequency of Information being transmitted
    - Difference between Static/Voyage Information and Dynamic Inforamion
  + How Class A AIS Operates
  + How Class B AIS Operates
  + Safety Messages
* Satellite Navigation Systems
  + Doppler Satellite Navigation Systems
    - US System (SATNAV)
    - Russian System (Leo SATNAV – Parus and Tsikada-M)
    - How Doppler Satellite Navigation Systems work
    - Frequency of Obtaining Fixes
  + Global Multidimensional Systems
    - US System – GPS
    - Russian – GLONASS
    - European Union – Galileo
    - How Global Multidimensional Systems work
      * 3 Segments – Satellite Segment, Control Segment, User Segment
      * Triangulation through obtaining distances from each Satellite – 3 Satellites for Lat and Long, 4 for Altitude
    - Satellite Navigation Errors (GDOP, UERE, SA)
    - Potential Disruptions in Satellite Navigation Systems
      * Intentional
      * Unintentional
      * Spoofing
      * Blocking
    - DGPS and how it works
* Wave Propagation
  + Amplitude, Frequency, Wave Length, Cycle
  + Reflection, Refraction, Diffraction
  + Ground Waves vs. Sky Waves
    - Line of Sight, Surface Waves, Ground Reflected Waves
  + Doppler Effect
  + The Ionosphere and how it is used to extend the distance of a radio wave
* RADAR/ARPA
  + Parts of the RADAR and what they do
  + Settings on the RADAR
    - What they do and what benefits/disadvantages do they have
    - Proper way to set up a RADAR
  + Window Gates, Guard Zones, Exclusion Zones
  + Auto Acquiring vs. Manual Acquiring a target with ARPA
  + Motion vs. Vectors (what does each setting actually accomplish)
  + True vs Relative (for both motion and vectors)
* Speed Log/Depth Sounders
  + How they work
  + Parts of the equipment and what they do
  + SOG vs. STW (benefits and disadvantages of both – when would you use one vs. the other)
  + Different types of Speed Logs

Potential Short Essay Questions

1. Is it mandatory for all vessels to have an active AIS at all times? Why or why not?
2. What aspects of Wave Propagation effect the range of an AIS? Explain how and why.
3. Explain the time intervals for transmitting the various types of AIS Information, including Dynamic, Voyage, and Static Information. Give several examples of each type.
4. What are the three Information Types which are transmitted by AIS. Why are they classified into three different groups? Give several examples of each type.
5. Explain how Global Multidimensional Satellite Navigation Systems work. Is it possible to obtain a full position at any time the receiver is able to communicate with the Satellite(s)? Explain why.
6. Explain how Doppler Satellite Navigation Systems work. Is it possible to obtain a full position at any time the receiver is able to communicate with the Satellite(s)? Explain why.
7. Explain what GPS, GLONASS, and Galileo are. Include both the similarities and differences between each system.
8. What is GDOP and what should a navigator be aware of in regards to it?
9. What is UERE and what should a navigator be aware of in regards to it?
10. What is SA and what should a navigator be aware of in regards to it?
11. Explain the similarities and differences between Class A AIS and Class B AIS. What are the advantages and disadvantages of both? Explain why.
12. Explain how Class A AIS determines the transmission frequency.
13. Explain how Class B AIS determines the transmission frequency.
14. Explain in detail, 3 different ways that the AIS can be utilized
15. Explain why many people view using AIS as a security threat. What are some techniques used to decrease this threat?
16. Explain what GPS spoofing is and how it works.
17. Explain what GPS blocking is and how it works.
18. What are Virtual Aids? What is your opinion on whether this is helpful or harmful for navigation? Explain why.
19. What are AIS Enhanced Aids? What is your opinion on whether this is helpful or harmful for navigation? Explain why.
20. What is Wave Propagation? Provide several examples of how we utilize this in Electronic Navigation.
21. What is the Doppler Effect? Name a piece of electronic navigation equipment which utilizes this principle and describe how it uses it to obtain information.
22. What aspect of Wave Propagation does a RADAR use? Explain.
23. What aspect of Wave Propagation does a Speed Log use? Explain.
24. What aspect of Wave Propagation does a Depth Sounder use? Explain.
25. What is Course Up? When would this be most useful? Why?
26. What is North Up? When would this be most useful? Why?
27. What is Head Up? When would this be most useful? Why?
28. Explain the setting of Pulse Length. Explain the various aspects of this setting.
29. Explain the setting of X-band vs. S-band. Explain the various aspects of this setting.
30. Explain the setting of Gain. How do you adjust this properly? What does it do?
31. Explain the settings of Rain and Sea Clutter. How do you adjust this properly? What does it do?
32. What is the process you take while setting up your RADAR. Explain why you chose each setting.
33. Explain how Window Gates Work. How does the ARPA obtain the speed, course, CPA, and TCPA of a target? How long does it take for the ARPA to provide useful information?
34. Describe the difference between Vectors and Motion.
35. Describe the difference between True Vectors and Relative Vectors.
36. Describe the difference between True Motion and Relative Motion.
37. When would you set your RADAR to True Vectors? When would you set your RADAR to Relative Vectors? Why?
38. In regards to the COLREGS, which is the better setting to use, SOG or STW? Why?
39. In regards to the Navigation, which is the better setting to use, SOG or STW? Why?
40. Explain how a Transducer converts an electrical signal into an acoustic signal.
41. Explain the utilization of PI lines including how to set them up and how to use them in navigation.
42. What is Bathymetric Navigation? How can a navigator use this information?