INSTRUCTOR'S REFERENCE FOR THE SUPPLEMENTAL HOMEWORK QUESTIONS FOR THE MARINE ELECTRONICS COURSE 97

The following 31 questions are supplemental homework questions for the Marine Electronics Course 97, and are provided for the Instructor with answers to each question in **bold.** along with a paragraph reference for the specific section in the text, and a critique for the answer.

1. Determine the power drawn in a circuit operating from a 12-volt battery with a resistance of 10 ohms.
    a. 1.2 watts
    b. 12 watts
    c. 14.4 watts
    d. 144 watts

Answer:
c. 14.4 watts.

Ref: Paragraphs 14 and 15.

Critique:
The power formula is Power (P) in watts is equal to Current (I) times Voltage (E), e.g., P = IE. First determine current flow (I) using Ohm's Law formula. I = E/R (I=12/10) or 1.2 amps. Then Power (P) is equal to current flow (I) of 1.2 amperes time voltage (E) of 12 volts or 14.4 watts.

2. When using a voltmeter, the leads should be placed:
    a. in series with the load.
    b. across the circuit (parallel) being tested.
    c. in the direction with current flow.
    d. in the opposite direction of current flow.

Answer:
b. across the circuit (parallel) being tested.

Ref: Paragraph 24 and Figure 1-4.

Critique:
Voltage may be read by placing the leads of the voltmeter across the circuit being tested. The direction of current flow determines the sign of the voltage (positive or negative) but not the voltage itself.

3. Conductance is a measure of:
    a. current.
    b. voltage.
    c reciprocal of resistance.
    d. power.

Answer:
c. reciprocal of resistance.

Ref: Paragraph 10h.

Critique:
Conductance is the comparative ability of material to conduct electricity. It is the reciprocal of resistance.

4. The flow of current in an electrical circuit increases as the circuit resistance decreases.
    a. True
    b. False

Answer:
a. True

Ref :Paragraphs 11, 12, and 13.

Critique:
The statement is true. Using Ohm's Law, E = I x R, we can see that if the voltage (E) remains a constant and resistance (R) decreases, then current (I) has to increase.

5. Rapid loss of water in a single cell may indicate:
    a. spillage of baking soda water in the cell during cleaning.
    b. need for improved battery ventilation.
    c. a bad cell and time to find a replacement battery.
    d. an overcharging regulator.

Answer:
c. a bad cell and time to find a replacement battery.

Ref :Paragraph 16.

Critique:
Rapid loss of water in a single cell may indicate a bad cell and that it's time to find a replacement battery. The rapid loss of water in all cells may indicate an overcharging regulator.

6. Rapid loss of water in all cells may indicate:
    a. spillage of baking soda water in the cell after cleaning.
    b. need for improved battery ventilation.
    c. a bad cell and time to find a replacement battery.
    d. an overcharging regulator.

Answer:
d. an overcharging regulator.

Ref:Paragraph 16.

Critique:
The rapid loss of water in all cells may indicate an overcharging regulator. The rapid loss of water in a single cell may indicate a bad cell and that it's time to find a replacement battery.

7. No galvanic action will occur between differing metals immersed in seawater if:
    a. the relative area of the less noble metal is greater in relation to the noble metal.
    b. they are painted.
    c. they are not electrically interconnected.
    d. a galvanic isolator is installed.

Answer:
c. they are not electrically interconnected.

Ref :Paragraphs 7 and 8, and Figure 5-2.

Critique:
For galvanic action to take place, differing metals, immersed in seawater need to be interconnected by a current-carrying conductor.

8. If a graphite motor brush (potential of + 0.20 volts) was immersed in salt water near an aluminum wire (potential of - 0.75 volts), the voltage between them would read:
    a. zero.
    b. 0.95 volts.
    c. 1.25 volts.
    d. 2.75 volts

Answer:
b. 0.95 volts.

Ref: Paragraph 11 and Table 5-1.

Critique:
From Table 5-1 we see that the potential of graphite is +0.20 volts and the potential of aluminum is –0.75 volts. Sum these numbers and the answer is 0.95 volts.

9. For added protection as a storm approaches, all necessary electronic equipment should be disconnected from power connections, antennas, and through hull sensors/transducers.
    a. True
    b. False

Answer:
a. True

Ref :Paragraph 45.

Critique:
The statement is true. Additional protection for electronic equipment can result in the equipment being disconnected from power connections (except ground), antennas, and through-hull sensors/transducers.

10. One kilohertz is:
    a. 1 thousand Hertz.
    b. 1 million Hertz.
    c. 1/1000 GHz.
    d. 1,000 KHz.

Answer:
a. 1 thousand Hertz.

Ref: Paragraph 4.

Critique:
One kilohertz (1 kHz) is equal to 1,000 Hertz. One megahertz is equal to one million Hertz (1,000,000 Hz), one thousand kHz (1,000 kHz), or 1/1000 GHz.

11. "FCC Type Approval" means that:
    a. the FCC has determined the equipment complies with all FCC Rules & Regulations.
    b. the equipment has a high reliability rating.
    c. the radio transmitter provides the full specified output power.
    d. the radio receiver has a very good sensitivity and selectivity.

Answer:
a. the FCC has determined the equipment complies with all FCC Rules & Regulations.

Ref: Paragraph 17.

Critique:
"FCC Type Approved" means that equipment has been submitted to the FCC, and the FCC has determined that they conform to the FCC specifications.

12. The transceiver may share circuitry between its transmitter and receiver and:
    a. has separate switches to change from transmitter to receive operation.
    b. uses a single switch to transfer from receive to transmit.
    c. must use separate antennas for receive and transmit.
    d. has less power than a stand-alone transmitter.

Answer:
b. uses a single switch to transfer from receive to transmit.

Ref: Paragraph 17.

Critique:
The transceiver may share circuitry between transmitter and receiver, usually uses a single switch to transfer from receive to transmit, and uses the same antenna to transmit and receive.

13. Weather channels (WX-1, WX-2, etc.) are found in the AM broadcast band.
    a. True.
    B. False.

Answer:
b. False

Ref :Paragraph 32 and Table 12-1.

Critique:
The statement is false. Weather channels (WX-1, WX-2, etc.) transmit on the frequencies in the marine VHF-FM band.

14. To maintain the resonant conditions as the frequency increases, the physical length of a dipole antenna must:
    a. increase.
    b. decrease.
    c. remain the same.
    d. change proportionally upward.

Answer:
b. decrease.

Ref: Paragraph 9.

Critique:
To maintain the resonant conditions as frequency increases, the electrical length (wavelength) decreases, and the physical length of the wire antenna decreases.

15. The postings of a ship's licenses are no longer required.
    a. True
    b. False

Answer:
a. True

Ref: Paragraph 40.

Critique:
The statement is true. However, the licenses must be on board and readily available for inspection by FCC and USCG.

16. In the event of a MAYDAY situation, you may legally use any type of equipment to communicate your emergency.
    a. True
    b. False

Answer:
a. True

Ref: Paragraph 38.

Critique:
The statement is true. In an emergency, you may use any means to attract attention to include visual signals, flares, audio signals, radios, and alarms.

17. The preferred EPIRB frequency for new installations is _____MHz because the equipment that operates on that frequency transmits the most detailed information about the vessel in distress.
    a. 121.5 MHz.
    b. 243.0 MHz.
    c. 406 MHz.
    d. 2182 KHz.

Answer:
c. 406 MHz.

Ref: Paragraphs 7 and 9.

Critique:
Satellite EPIRBs transmit on a frequency of 406.025 MHz. Homing by SAR air and ground units is accomplished by a separate 121.5 MHz beacon.

18. DSC stands for:
    a. Differential Selective Calling.
    b. Distress Special Communication.
    c. Digital Selective Calling.
    d. Distress and Safety Communication.

Answer:
c. Digital Selective Calling.

Ref: Paragraph 13.

Critique:
DSC stands for Digital Selective Calling.

19. The Federal Radionavigation Plan (FRP-99) recognizes what four phases of marine navigation?
    a. Rivers, Lakes, Coastal, Oceans.
    b. Inland Waterways, Harbor/Harbor Approach, Coastal, Oceans.
    c. Radar, Loran-C, GPS, RDF.
    d. Active, Passive, Satellite, Celestial.

Answer:
b. Inland Waterways, Harbor/Harbor Approach, Coastal, Ocean.

Ref: Paragraph 12.

Critique:
The Federal Radionavigation Plan (FRP-94) recognizes these four phases of marine navigation: Inland Waterways, Harbor/Harbor Approach, Coastal, and Ocean.

20. To perform maintenance or repair on a depth sounder, the technician needs:
    a. General Radiotelephone Operator's License.
    b. Marine Radio Operator's Permit.
    c. Restricted Operator's Permit.
    d. no license.

Answer:
d. no license.

Ref: Paragraph 27.

Critique:
There are no license or permit requirements for a technician to work on a depth sounder.

21. A radar's _____defines range resolution while _____defines bearing resolution.
    a. pulse duration, antenna scan rate.
    b. pulse duration, radiated horizontal beam width.
    c. pulse repetition frequency (PRF), pulse duration.
    d. pulse repetition frequency (PRF), radiated vertical antenna scan.

Answer:
b. pulse duration, radiated horizontal beam width.

Ref: Paragraph 35 and Figure 17-6.

Critique:
Range resolution is determined by the pulse duration while bearing resolution is determined by the radar antenna’s horizontal beam width.

22. Radar may be used in collision avoidance. The plotting of another ship's relative speed and bearing provides valuable information. Assuming the other ship is off your starboard side, if the range to a radar target is decreasing while the relative bearing remains constant, your vessel:
    a. is proceeding on a course as it is the privileged vessel.
    b. is on a collision course with the target.
    c. will pass ahead of the other ship.
    d. will pass astern of the other ship.

Answer:
b. is on a collision course with the target.

Ref: Paragraph 45 and Figure 17-8.

Critique:
This question does not provide enough information to determine if your vessel is the privileged or stand-on vessel. This is similar to the visual condition in which an approaching vessel appears to remain on a stationary, and collision bearing. The correct answer for this question is that the two vessels are on collision courses.

23. Loran-C operates in the _____band.
    a. low frequency (LF).
    b. Medium frequency (MF).
    c. AM broadcast.
    d. VHF frequency.

Answer:
a. low frequency (LF)

Ref: Paragraph 17.

Critique:
Loran-C operates on a low frequency (LF) radio carrier of 100 kHz.

24. Loran-C offers worldwide coverage from a master station in Seneca, NY.
    a. True
    b. False

Answer:
b. False

Ref: Paragraph 3.

Critique:
The statement is false. Loran-C does not provide worldwide coverage. There are 16 chains located in the U.S. and overseas. The master station for the Northeast U.S. chain is located in Seneca, NY.

25. Loran-C signals travel most predictably in:
    a. hot, dry climates.
    b. the presence of nearby cold fronts and thunderstorms.
    c. warm summer nights with steady rain.
    d. cool, clear weather.

Answer:
d. cool, clear weather.

Ref: Paragraph 48.

Critique:
Loran-C signals travel most predictably in cool, clear weather, and least predictably during hot weather with nearby cold fronts and thunderstorms.

26. For a GPS receiver to establish a fix it can take as long as 30 minutes for a "cold start" or less than one minute for a "warm start".
    a. True
    b. False

Answer:
a. True

Ref: Paragraphs 33 and 34.

Critique:
The statement is true. Acquisition time from a “warm start” is usually less than one minute. Cold starts may require from 10 to 30 minutes.

27. A modern remote-reading compass can be integrated into related control systems and:
    a. provides only for analog readout.
    b. can provide either analog or digital readout.
    c. provides for digital readout.
    d. is not compatible with autopilot steering equipment.

Answer:
b. can provide either analog or digital readout.

Ref: Paragraphs 8 and 9.

Critique:
A remote-reading compass can interface with more than one display or other devices requiring compass information. Readouts may be either in digital format or on an analog 360-degree face.

28. Electronic charts may be of either raster or vector format.
    a. True
    b. False

Answer:
a. True

Ref: Paragraph 27.

Critique:
The statement is true. Electronic charts are available in either vector graphics format or full raster scanned copies.

29. A data bus system can process and display not only boat speed and wind data, but also temperature, barometric pressure, and compass information.
    a. True
    b. False

Answer:
a. True

Ref: Paragraph 45.

Critique:
The statement is true. A data bus system can process and display not only boat speed and wind data, but also temperature, barometric pressure, and compass information.

30. U.S. Government NOS raster-scanned electronic charts are commonly obtained via:
    a. floppy disks or CD-ROMs.
    b. EPROMs.
    c. electronic chips.
    d. are easily downloaded over the Internet directly to your on-board computer.

Answer:
a. floppy disks or CD-ROMs.

Ref: Paragraph 27.

Critique:
U.S. Government NOS raster-scanned electronic charts are available on floppy disks or CD ROMs.

31. An automatic pilot consists of what three basic units?
    a. control unit, power supply, display unit.
    b. direction finder, drive unit, rudder angle indicator.
    c. heading sensor, control unit, drive unit.
    d. differential steering unit, power supply, scanner.

Answer:
c. heading sensor, control unit, drive unit

Ref: Paragraphs 11, 12, and 17.

Critique:
The heart of an automatic steering system is its heading sensor. The control unit receives the error signal from the heading sensor and sends a correction signal to the drive unit.