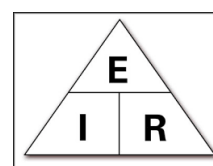


## Foundation Licence Practice Test -- ANSWERS

Page references are to the Handbook Third Edition

1. You get zapped touching a machine after walking on carpet. What sort of electric charge is this? **Static electricity. Page 4**
2. Complete the sentence. An electric current is **the ordered movement of electrons from a negative point to a positive point. Page 5**
3. What is the difference between a conductor and an insulator?  
**Conductors allow electrons to move while an insulator prevents the movement of electrons. Page 6**
4. If current moves only in one direction, how is this referred? **Direct current DC. Page 6**
5. If current moves back and forth or is cyclic, how is this referred?  
**Alternating current AC. Page 6**
6. What does EMF stand for? **Electro Motive Force Page 6**
7. EMF goes by a common name as **voltage?** Page 6
8. What is the opposition to electron flow called and what unit is it measured in? **Resistance measured in Ohms. Page 7**
9. DC circuits are polarity critical. What does this mean? **If the battery is connected with the wrong polarity, the circuit can be damaged.**
10. What voltage can a single carbon zinc cell generate? **Approximately 1.5v Page 8**



11. Draw the Ohms law triangle and enter the units. Page 9
12. Define and explain each of the units. **E= Electromotive force measured in volts, I is the intensity of the current measured in amps and R is resistance measured in Ohms. Page 8**
13. Calculate the following:

$$E = 20v$$








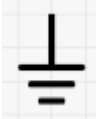
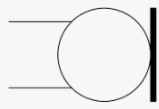
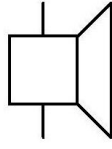
$$I = 0.2A$$

$$100\text{Ohms}$$

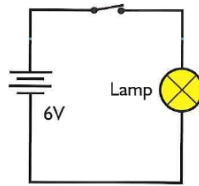
$I = 2A$        $R = 100\Omega$       **200 Volts**

$R = 1000\Omega$      $E = 500v$       **0.5 Amps**

14. Resistors and other items are given a power rating. What unit is power measured in? **Watts Page 9**
15. How is the value of a resistor displayed? **Colour coded bands around the resistor. Page 10**
16. What is the formulae to calculate the power if the voltage and current are known?  **$P=IE$  Page 10**
17. Calculate the following:  $E = 20v$   $I = 0.2A$     **4 Watts**  $I = 2A$   $R = 100\Omega$   
**400 Watts**  $R = 1000\Omega$   $E = 500v$     **250 Watts**
18. What do the following symbols represent? Page 75

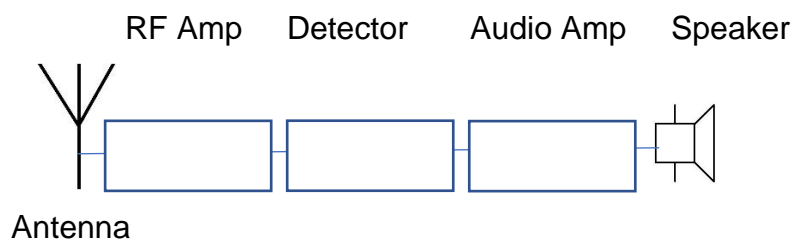
 <p>A      Cell</p>	 <p>B      Battery</p>
 <p>C      Switch</p>	 <p>D      Fuse</p>
 <p>E      Resistor</p>	 <p>F      Lamp</p>
 <p>G      Aerial</p>	 <p>H      Earth</p>
 <p>I      Microphone</p>	 <p>J      Speaker</p>

19. In question 18 A, which side is positive? **The side with the longest line. (Left)**
20. How are conductors shown in a circuit? **Lines Page 10**
21. Draw a circuit of a torch with a battery, closed switch and a lamp. Page 10



22. What do the following readings mean? Eg 1kV means 1kilo volt or 1000v  
 6mv = **6 millivolts or .006 volts**    10MΩ = **10 megaohms or 10,000,000 ohm**    **66μA = 66 microamps or .000066 amps Page 11**
23. What is the unit of frequency? **Hertz Page 11**
24. What does the terms MF, HF VHF and UHF represent and what frequency range applies to theses?  
**MF = Medium Frequency 300kHz to 3MHz**  
**HF = High Frequency 3- 30MHz**  
**VHF = Very High Frequency 30 – 300MHz**  
**UHF = Ultra High Frequency 300 – 3000 MHz    Page 12**
25. What band would 2M or 144MHz band fall within? **VHF band Page 12**
26. Why do we have dedicated amateur bands? **So the radio spectrum can be shared with other users.**
27. Describe the wavelength of a signal. **Wavelength is the distance one cycle would travel in one cycle. Page 12**
28. Wavelength is calculated by dividing 300 by the frequency in MHz.  
 $\lambda = 300 / \text{frequency in MHz}$ . What is the wavelength of a 28MHz signal? **10 Metres**
29. To transmit information over a distance, a carrier signal needs to be modulated in some way. The two common ways this is done is by AM and FM. What do these terms mean and how does it work?  
**AM amplitude modulation is where the amplitude of the carrier wave changes in sympathy with the voice modulation. FM frequency modulation- frequency of the carrier wave changes in sympathy with the voice modulation. Page 15**

30. What does the term USB LSB mean? **Upper side band and lower side band**
31. What is the maximum peak power level a Foundation licence holder can emit? **10 Watts Page 16**
32. What does “frequency deviation” mean in regard to an FM signal? **Frequency deviation is the amount the carrier wave changes in frequency with a modulated signal. Page 16**
33. When modulating a carrier signal with voice, what is the frequency range of the modulating signal? **Approx 20Hz to 20KHz.**
34. What is a signal bandwidth? **Signal bandwidth is the amount of spectrum used up by a modulated signal. Page 16**
35. What is a detector and a discriminator? **A detector is used to remove information from an AM signal and a discriminator is used to remove the information from an FM signal. Page 17**
36. Three aspects of a receiver are sensitivity, selectivity and stability. What does each term mean? **Sensitivity is the ability to receive a weak signal. Selectivity is the ability to select a station from other stations near the same frequency. Stability is the ability to remain on frequency. Page 17**
37. Fill in the parts of a simple receiver.



38. What is the final stage of a transmitter? **The RF amp.**
39. What do transmission lines do? These are also referred to as feedlines or feeders. **Transfer the signal to and from the transmitter to the antenna. Page 22**
40. What are the two types of feedlines? **Coaxial 50Ω unbalanced and parallel line 300-600Ω balanced. Page 22**
41. What instrument would you use to test the continuity of a cable? **Ohm meter Page 24**

42. Why should antennas be fitted with lightning protectors? **Stop damage to equipment and injury to operators.**

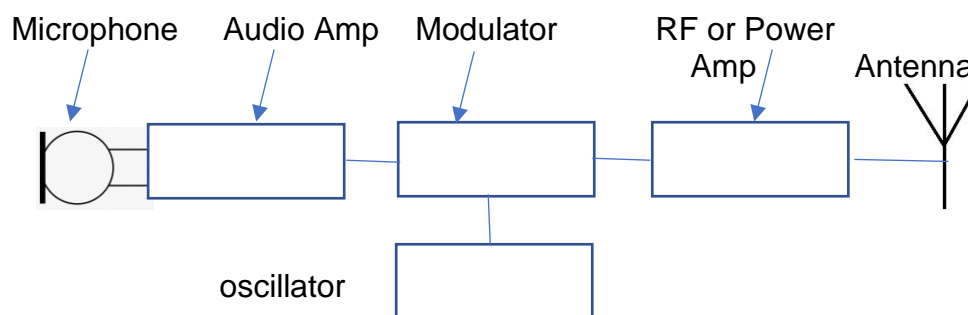
43. Name five types of antenna. **Dipole, Ground plane, folded dipole, Yagi and end fed antennas. Page 25**

44. What does SWR stand for and what does it measure? **Standing wave ratio is the ratio of the incident and reflected power which indicates if the antenna is matched to the transmitter. Page 27**

45. What does ATU stand for and what does it do? **May make it possible to match output of the transmitter. Page 29**

46. What device would you use if you wanted to test the output power of the transmitter without sending a signal up the antenna? **Dummy load. Page 30**

47. Fill in the name of the parts for a transmitter.



48. What is a balun? **Matches balanced to unbalanced feedline to the antenna. Page 30**

49. With regards to antennas, what do the following terms mean?  
**Directivity is the ability to focus the signal in a given direction.**  
**Gain is achieved by focusing the signal in a given direction.**  
**Beamwidth is the width of the signal beam from a directional antenna.**

**ERP perception of increased power by a directional antenna. Page 31**

50. What do the terms horizontal, vertical and circular polarization mean with regards to antennas? **Horizontal signal level with horizon, vertical at right angles to horizon and circular is twisting. Page 31**

51. Convention has it that VHF, UHF and mobile signals are transmitted on a vertical antenna. What antenna polarisation should the receive antenna be? **Vertical Page 31**
52. Describe an isotropic antenna. **Isotropic antenna is a theoretical antenna that radiates the same in all directions. Page 33**
53. What are the four layers in the ionosphere that impact HF communications? **F2, F1 E and D layers. Page 34**
54. What happens to these layers during the night? **The F layers combine, and the D layer dissipates.**
55. Why does sunspot activity impact HF radio communications? **Sunspots create solar radiation, and these affect the ionosphere. Page 35**
56. The distance a VHF or UHF signal can travel under normal circumstances is defined by four factors. What are these? **Antenna height, clear line of sight, Tx power and Rx sensitivity. Page 36**
57. What is Tropospheric ducting? **Where a radio signal can be channelled between layers in the ionosphere. Page 37**
58. What is the MUF? **The Maximum Usable Frequency (MUF) is the highest frequency usable that will be refracted by the ionosphere. Page 34**
59. What is the radio squelch? **Silences the radio speaker when no signal is present. Page 39**
60. What does RIT stand for and how does this help the operator? **Receiver Incremental Tuning RIT allows the operator to change the receiver frequency slightly without changing the transmit frequency. Page 40**
61. Can a Foundation licence holder modify their radio internals? **Yes (Recent changes)**
62. In the current Australian 240v wiring system, what colour is the earth wire? **Green./Yellow Page 44**
63. Why is an earthing system, for both mains electrical and RF signals, so important? **Mains for safety and RF to minimise chance of interference. Page 55**
64. What can happen if the antenna or the antenna tuner are not tuned correctly? **This may cause interference to other spectrum users.**

65. What equipment in your shack could give you an RF burn? **Antennas, feedlines or final stages in the Tx. Page 48**
66. What is EMC and EMI? **Electromagnetic Compatibility EMC) The ability of sensitive electronic equipment to operate in the vicinity of each other. Electromagnetic Immunity EMI is the ability of electronic equipment to operate in strong electromagnetic fields. Page 52**
67. If your station causes interference, what should you do? **Fix it and stop transmitting till you do.**
68. In an AM transmitter, what can happen if you over drive the AF stage of the transmitter? **The AM signal can be distorted and cause interference.**
69. What is a choke, why is it needed and how does it work? **A choke is a form of inductor. It helps to suppress spikes and high frequencies. It's a low pass filter. Page 53**
70. What is the maximum power allowable for a Foundation licence? **10 watts peak power Px Page 59**
71. On which bands is FM allowed with a Foundation licence? **All bands**
72. In some situations, a vessel or aircraft may need assistance. What are the distress and urgency signals for both telephony and telegraphy?

Type	Telephony	Telegraphy
Urgency	Pan	xxx
Distress	Mayday	SOS

73. Write the word " Antenna" using the phonetic alphabet. **Alpha November Tango Echo November November Echo Alpha Page 63**
74. What is CTCSS and DTMF? **Continuous Tone Coded Squelch System for shared resources. Dual Tone Multiple Frequency send digital info by audible tones. Page 68**
75. What would be the call sign prefix for Tasmania and Northern Territory? **VK7 and VK8 Page 76**
76. What is meant when you receive a signal from a VK3RNL? **A repeater station operating in Victoria. Page 76**

77. What should you do, as a licenced amateur operator, if you change your address? **Notify ACMA.**
78. What is meant by QRN causing you to QSY? **Lot of radio noise causing you to change frequencies. Page 85**
79. Can any amateur transmit any entertainment or advertisements? **No Page 58**
80. What does the giving of a signal report of 5/9 mean? **Readability is 5 out of 5 and signal strength is 9 by the meter. Page 65.**
81. What is the third number in a signal report and when is it used? **Tone for CW Page 66**
82. You see someone being electrocuted, what should you do? **Don't touch them, isolate power. If you cannot isolate power, use an insulator to push them away from the danger. Apply first aid and call for assistance.**
83. Why should your amateur station be secured at all times? **To prevent unauthorised use of the amateur equipment.**
84. How do you calculate the wavelength of a frequency? **300 / Freq in MHz**
85. Define a wavelength. **The distance one cycle of the measured wave travels.**
86. How do you calculate the power in a circuit knowing the voltage and current?  **$P = IE$**
87. What are the four ionospheric layers? **F2, F1 E and D**
88. What is the difference between telegraphy and telephony?  
**Telegraphy is Morse code and telephony (as in phone) is voice.**
89. What is the distress signal in telephony and telegraphy? **Mayday and sos in morse code**
90. What is the urgency signal in telegraphy and telephony? **xxx and pan**
91. What are the three features in a receiver? **Sensitivity, selectivity, and stability**
92. Signal reports can have three levels. What are they? **Readability, signal strength and tone**
93. What is an RF burn and where can you get it? **Burn from an RF signal. Transmitter, transmission lines or antenna.**



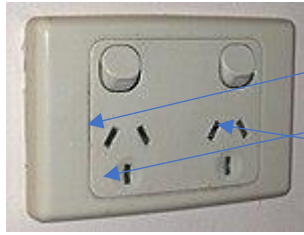
94. What is an isotropic antenna? **A theoretical standard antenna.**
95. Explain what SWR. **Standing wave ratio is the ration of power up to power back.**
96. If an antenna is cut for a frequency range the SWR is higher only at the bottom end of the antenna frequency band, what can you do to fix this?  
**Antenna is too long**
97. If an antenna is cut for a frequency range the SWR is higher only at the top end of the antenna frequency band, what can you do to fix this?  
**Antenna is too short**
98. What are the colours of the wires in a 240v cable?

Connection	Current colours (SI Standard)	Old colours
Active	Brown	Red
Neutral	Blue	Black
Earth	Green Yellow	Green

99. What is the purpose of the chassis earth? **If a component fails and allows the chassis to become live, the earth wire will prevent the operator getting electrocuted.**
100. Mark the three pins on the diagram below.



101. Mark the sockets on the diagram below.



- A Active
- B Earth
- C Neutral

102. To measure voltages at the power point, how would you set the multimeter range? **240v or greater and AC.**
103. In question 99, if the power is on and you measured the voltages across the following pins, what would the readings be?

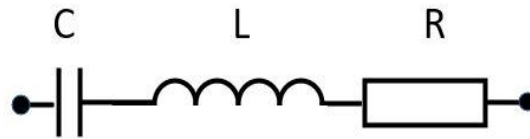
Pins	Voltage	Frequency
A - B		
A - C		
B - C		

#### Extra questions for Edition 4

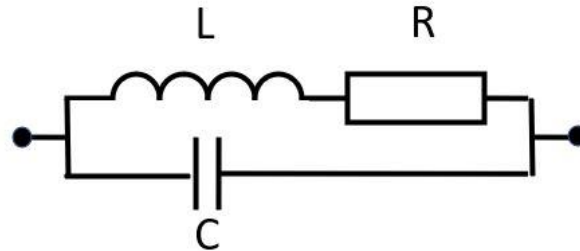
##### Resonance

1. What is a capacitor? A capacitor is a component for storing electrical energy. **It consists of two conductors in close proximity and separated by a dielectric. Measured in Farads.**
2. What is an inductor? **An inductor, also called a coil, choke, or reactor, is a component that stores energy in a magnetic field when electric current flows through it. An inductor typically consists of an insulated wire wound into a coil. Measured in Henrys**
3. What is capacitive or inductive resistance called? **Reactance XC and XL**
4. All tuned circuits have a resistance. What is this combined resistance called? **Impedance**
5. What is back-EMF? **The voltage generated when the field in an inductor collapse.**
6. What does resonant frequency mean? **The frequency at which something vibrates.**

7. Draw the following diagrams.



- Series tuned circuit.



- Parallel tuned circuit.

8. Which component can be made variable to adjust a tuned circuit? **Either capacitor or inductor.**

### Digital Signals

1. What is an analogue signal? **An analogue signal is a signal that changes in amplitude over time when impacted by an external data.**
2. What is a digital signal? **A digital signal represents data as discrete values.**
3. What is an ADC and how are they used? **ADC converts analogue signals to digital signals.**
4. What is a DAC and how are they used? **DAC converts digital signals to analogue signals.**
5. Explain duty cycle. **The duty cycle is the ratio of the time a piece of equipment is operating to time it is off.**

### Decibel

How would you best describe the use of the decibel in amateur radio?

1. **The dB is a ratio of one level against a second level.**
2. **The measuring points for the dB levels must be at the same impedance / resistance.**

### Signal Reports

1. Name the three parts to a morse code signal report. **Readability - Signal Strength – Tone (RST)**
2. Which of these is most common for amateur radio operators? **RS**
3. What is the scale for R in the report? **Scale of 1 -5**

4. Where is the S report derived? **Form the S meter on the receiver.**
5. S9 is a measured voltage at the antenna. What is this voltage? **50 $\mu$ V**
- 1.

### **Supplementary Questions for V10 of Syllabus**

1. Can you contact a station outside the amateur bands if there is a distress call? **Yes. Only to reply to the distress station if there is no other response.**
2. What type of messages are prohibited when passing messages for a third party? **Any message related to business of financial gain.**
3. On hearing a distress or urgency call, what should you do as the operator? **Monitor the call and report this to the appropriate authorities.**
4. How often should you identify your station on air? **Every 10 minutes even during testy calls.**
5. Can you transmit entertainment on amateur bands? **No**
6. A Foundation licence is limited to 10 watts pX. What is pX? **pX is Peak Envelope Power (PEP)**
7. If you move house, do you have to notify ACMA? **Yes. Any change to your licence needs to be notified.**
8. What does LCD stand for? **Licence Condition Determination (LCD). Full title is Radiocommunications Licence Conditions (Amateur Licence) Determination 2015. Made under paragraph 107(1)(f) of the Radiocommunications Act 1992. Compilation No. 3**
9. What is the voltage and frequency of the domestic electricity supply in Australia? **240V AC at 50Hz**
10. Effective Radiated Power (ERP) is calculated by the combination of two measurements. What are these two? **ERP is a combination of the power from the transmitter and the gain provided by the antenna.**
11. Why is the ionosphere important in HF transmissions? **Changes to the ionosphere can alter the distance a HF signal can travel.**
12. Radio waves can be impacted through the following ways. Explain each one with respect to radio signals.

**Reflection – A signal is return at the same angle from the reflection point.**

**Refraction – The signal angle is altered when passing through a layer.**

**Absorption – A signal is absorbed by a layer.**

**Polarisation – The polarisation is determined by the orientation of the antenna. Can be vertical, horizontal or circular.**

13. Earthing points in a radio shack are important. The critical ones are electrical earth and signal earth. Why is this so important? **Electrical earth prevents electric shock. Signal earth prevents electrical eddy currents being generated in the transmission lines which may cause interference.**
14. A fuse has three parameters and any replacement fuse must match the parameters of the blown fuse. What are the three parameters? **Voltage, current and speed the fuse operates.**
15. The syllabus states that it is desirable that a station has a switch clearly marked to isolate all power in the station. Why would this be so? **To isolate power in the event of electrocution.**
16. You find a person has touched wires and is being electrocuted. What are you actions? **Isolate the power (Don't touch the person till you do) call for assistance and perform CPR if required.**