Additional Study Resources Available for 2018 Wonders of Electricity Events

The following is an individual contribution. Neither the IEEE, the Science Olympiad, or the University of Delaware recommend or approve either the web sites or any content presented in this document. Use at your own risk.

1) Ensure you follow the Wonders of Electricity presentation to focus on the core concepts and knowledge covered in the competition test. Do not overlook the history pages.
Get a feeling for what each page covers as a group or area to guide your studies in the resource presented below.
Keep in mind that the testing will only cover what is presented in the Wonders of Electricity handout and listed for Div B or Div C.

2) Suggested additional resource http://www.ibiblio.org/kuphaldt/electricCircuits/

a) These are free text books in six volumes called Lessons in Electric Circuits written for a beginner working to attain a technician level certification or degree.

   PARENTS – IMPORTANT !!!
   1. Many (but not all) of the sections within each chapter provide a review list of the key concepts the student is to know.
   2. Be aware that each chapter in a given volume may go into greater depth on each topic beyond that covered in the Wonders of Electricity. It could be easy to overwhelm your student or side track them from preparing for the test competition. The intent is to provide enough knowledge to encourage and be fun while learning the fundamentals for the test.
   3. You might be interested in the appendix in Vol1–6. It describes how and why these books are available and free.
   4. Review the table of contents and the content of each volume. Core concepts keep reappearing in different contexts within the advanced topics as one moves through each volume. It might give an indication of were to stop within a given topic in test preparation for Div B or Div C.

b) Download all six (6) volumes.

c) Vol1 – DC covers the fundamental concepts from units, math, charge, to voltage, current, Ohms law, power, capacitors, magnetism, inductors and more as presented at the Workshop but not in the same order. See Vol 3, chapter 9.1 for more information on the damage electrostatic discharge can cause. Do not overlook the chapters on Series-Parallel circuits, Batteries, Magnetism and Electromagnetism, and RC time constants for the more advanced.

d) Vol2 – AC extends the electrical discussion to alternating voltage, current, transformers, motors, and much more.

e) Vol3 – Semiconductors.
   1. Chapter 1, Section 1.1 and 1.2 provides a nice overview to this topic.
   2. Chapter 2: Section 1 – 4 presents the background to and including the P-N Junction. These sections matches well with the workshop discussion and presentation.
   3. Chapter 3 Diodes and Rectifiers, Section 3.1 – Introduction provides additional understanding of how diodes work and review of the P-N junction. Also introduces the LED and solar cells.
   4. Chapter 8 presents the Operational Amplifier for the more advanced students.

f) Vol4 – Digital Logic. Covers Number Systems, Binary arithmetic, Logic Gates, and Boolean Algebra covered within the Workshop and presentation material.

g) Vol5 – Reference covering units, arithmetic, algebra, and trig, plus DC and AC equations, circuit symbols and the periodic table. The can be a review reference with solved problems included.

h) Vol6 – Experiments and Projects – setting up a home lab

Additional Study Resources Available for 2018 Wonders of Electricity Events

The following sites provide a wealth of material for the beginner all the way to the advanced and experienced EE, technician, as well as the hobby builder. These sites are provided to expose one to the broad range of electrical and electronic information and potential career interests available on the internet. There are literally thousands of web sites covering every aspect of learning / applying electronics and electrical engineering, including the how-to math to design and build at all levels of knowledge within every technical or non-technical discipline one can think of.

Circuit Tutorials

This site is for college age. If one scrolls down you find all types of information for the beginner. Worth looking through. Even embedded within its large list of electrical related resources is the All About Circuits site which is referenced on the first page resource web site.
Jim Fiore at MVCC

Large educational offerings on-line. Click on "Education" in the menu. 14 and up friendly. One of the better sites IMHO.
All About Circuits : Free Electric Circuits & Electronics Textbooks

This site is very slow but has similar information as the two above. Still some good downloads.
Electronic Teacher-Tutorials, Electronic Kits

Free professional educational videos. Click on the drop-down 'Subjects' menu to grasp the breath and depth of offeringts.
https://www.khanacademy.org/math/pre-algebra/pre-algebra-exponents-radicals/pre-algebra-scientific-notation/v/scientific-notation

Do not be alarmed by the name below. In today's world Hack = Maker or Builder. Entire site is for 14 and up crowd to learn and buy parts and components. This is an Internet version of Radio Shack of decades ago. Many sites (search 'maker') like this on the internet. UofDel has it's own Maker facility on campus.

https://hackaday.com/

FAA courses: Math of Exponents and Math of Powers of Ten, Fundamental Concepts-DC Circuits, Solid State Devices – start on page 34-starts at basics of atoms and periodic table within the introduction to the P-N Junction and diode.

Different formula charts and constants, plus SI metric notation.
https://drive.google.com/