Courseware

JOB FUNCTION 2: Electrical and Electronic Systems

Electrical and Job Safety

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Personal Protective Equipment	Los Angeles County MTA	PowerPoint – 64 slides	**Overview/Objectives:** Presentation designed to assist trainers conducting OSHA 10-hour General Industry training. Emphasizes hazard identification, avoidance, and control – not standards. No attempt has been made to treat the topic exhaustively. Trainers need to tailor their presentations to the needs and understanding of their audience. **Assessment:** - Good material but limited to PPE - Well organized - Many good graphics & illustrations
Electrical Safety Subpart S	Los Angeles County MTA	PDF, 248 Pages	**Overview/Objectives:** Provides comprehensive training on wide range of electrical safety subjects **Assessment:** - excellent resource materials - excellent use of graphics, photos and text - extremely comprehensive

Courseware Title	Source	Media	Notes
			- includes terminology/definitions - includes PPE
Basic Technician Study Guide Chapter 2	UTA - Utah	Manual	**Overview/Objectives:** Chapter 2 includes material on electrical safety. **Assessment:** See other UTA references
Welcome to ARAT Module One • Electrical One • Powertrain • Electrical Two Includes: • PowerPoint presentation • Student Handout • Lesson Plan • Labs • Test questions	NJT – New Jersey	PowerPoint, pages 8-9	**Overview/Objectives:** - See Introduction to Electricity below **Assessment:** - See Introduction to Electricity below
THIRD PARTY MATERIAL			
TPC Training Series Industrial Safety and Health: TPC Training Course #109.1	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $78 - On-Line $75 each	**Overview/Objectives:** Examines electrical hazards and stresses the importance of electrical safety. Covers the equipment and procedures necessary to work safely with electricity, including PPE, lockout/tagout, and first aid. Explains the importance of grounding. Describes many kinds of fuses, circuit breakers, and motor protection devices and their uses. **Assessment:** - Appears to be extremely comprehensive - Available in English and Spanish

Courseware Title	Source	Media	Notes
			- Available in hardcopy and as online course
Course 205.1: Electrical Safety and Protection		Manual (English and Spanish) $57 - On-Line $75	**Overview/Objectives:** See other TPC references **Assessment:** See other TPC references
Industrial Skills Training Safety Training Electrical Safety Training	Coastal www.coastal.com	Multiple:\Online courses, DVDs, workbooks, instructor led, e-learning, etc	Includes: - Lockout/Tagout - Various Electrical safety training topics

Introduction to Electricity

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Advanced Coach Electrical Theory and Maintenance – Part B	Utah Transit Authority (UTA)	Manual in PDF, copyright protected, 414 pages	**Overview/Objectives:** Covers electrical and electronic theory and multiple circuit configurations. Chapter 1 – Theory of Current Chapter 2 – Voltage Chapter 3 – Electric Power Production Chapter 4 – Resistance Chapter 5 - Ohms's Law Chapter 6 – Magnetic Field Chapter 7 – Electrical Measurements Chapter 8 – DC Circuits Chapter 9 – Inductance Capacitance Chapter 10 – Alternating Current

Courseware Title	Source	Media	Notes
			Chapter 11 – AC Measurements Chapter 12 – Transformer Action **Assessment:** - Developed for bus and provides excellent electrical/electronic training material with broad application - Excellent use of graphics and text - Review questions included at the end of each chapter
Welcome to ARAT Module One • Electrical One • Powertrain • Electrical Two Includes: • PowerPoint presentation • Student Handout • Lesson Plan • Labs • Test questions	NJT – New Jersey	PowerPoint	**Overview/Objectives:** - Describe electrical theories - Identify circuit components - Construct series & parallel circuits - Measure voltage, amperage and resistance using a multi meter - Perform a voltage drop test Assessment: - Comprehensive course, 5 day class - Excellent presentation materials with graphics and text - Includes hands-on lab exercises - Includes performance test with stated passing requirement
THIRD PARTY MATERIAL			
TPC Training Series Electrical Systems, TPC Series 200	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $65 - On-Line $75	**Overview/Objectives:** Covers basic, nonmathematical approach to understanding principles of electricity. Introduces electron theory, static electricity, electrons in motion, and magnetism. Covers basic methods of measuring current, voltage, and resistance; circuits and simple Ohm's laws calculations.

Courseware Title	Source	Media	Notes
			Lesson 1 - Introduction to Electricity Lesson 2 - Static Electricity Lesson 3 - Current Electricity Lesson 4 - Magnetism Lesson 5 - Current, Resistance, and Potential Difference Lesson 6 - Electrical Components Lesson 7 - Conductors Lesson 8 - DC Circuits Lesson 9 - AC Circuits Lesson 10 - Electronics **Assessment:** - see other TPC assessment
Foundations of Electronics: Circuits & Devices, 4th Edition Russell L. Meade, Robert Diffenderfer	Delmar www.delmar.cengage.com	Hardcover Book, 1184 pages, $183	**Overview/Objectives:** Introduces readers to the world of electronics technology through extensive use of color charts, photographs, schematics and diagrams. Ideal for technician training; explores basic concepts such as voltage, current, plus power and resistance in series, parallel and combination circuits. Step-by-step examples and practice problems appear directly after explanations of key concepts, providing a bridge between must-know theory and hands-on circuit work. Learning objectives, summaries and other pedagogical aids have also been integrated into every chapter to motivate users and build their confidence. **Assessment:** - Comprehensive; may be too detailed and academic
Electronic Principles, 7th Edition Albert Malvino, David J. Bates	Book: www.Amazon.com, $122 Website: www.malvino.com/	Textbook with on-line material to support instruction	**Overview/Objectives:** Electronic Principles, Seventh edition, is written for electronics students who have done course work in basic DC/AC circuit analysis, along with

Courseware Title	Source	Media	Notes
			algebra and trigonometry prerequisites. The book gives clear, accessible coverage of basic electronics concepts in the first half of the book, then applies these to the important electronic circuits and devices most widely used in today's industry. **Assessment:** - Website provides both student and instructor support; password protected, need to purchase textbook - Site provides instructors with Instructor's Manual, and PowerPoint Slides
Industrial Skills Training Electrical Training	Coastal www.coastal.com	Multiple:\Online courses, DVDs, workbooks, instructor led, e-learning, etc	**Overview/Objectives:** An innovative, employee-friendly company dedicated to producing world-class training that improves the well-being of workers around the world. **Assessment:** - Offers full range of technical training - Free examples available online
Kevin Sullivan's Autoshop 101	www.autoshop101.com/	Online instruction	**Overview/Objectives:** - easy to follow with many graphics - Covers electrical fundamentals, electrical circuits, and others **Assessment:** - Many useful links to other free instructional material - Designed to prepare students for ASE testing - Useful material to aid instructors

Courseware Title	Source	Media	Notes
Electrical Principles and Practices 3rd Edition Glen A. Mazur, Peter A. Zurlis	American Technical Publishers www.go2atp.com	**Textbook:** 517 pages, $74	**Overview/Objectives:** Electrical Principles and Practices is an introduction to electrical and electronic principles and practices and their uses in residential, commercial, and industrial applications. Provides an introduction to electrical and electronic principles and practices and their uses in residential, commercial, and industrial applications. Also includes personal protective equipment, NFPA 70E, basic first aid, test instruments, printreading, and programmable logic relays. The CD-ROM in the back of the book is a self-study aid to enhance text content. **Assessment:** - One reviewer says: "Well written and organized book, mainly for those who want to immerse themselves on Electrical fundamentals and theory. Great illustrations and diagrams. It definitely shows the author knowledge on the subject as well as his ability to teach it. It is not for the typical do it yourself reader."
Navy Electricity and Electronics Training Series Module 1, Introduction to Matter, Energy, and Electricity	Naval Education and Training Professional Development And Technology Center **www.hnsa.org/doc/neets** Approved for public release; distribution is unlimited	PDF available free online	**Overview/Objectives:** Introduces the course with a short history of electricity and electronics and proceeds into the characteristics of matter, energy, and direct current (dc). It also describes some of the general safety precautions and first-aid procedures that should be common knowledge for a person working in the field of electricity. Related safety hints are located throughout the rest of the series, as well.

Courseware Title	Source	Media	Notes
			Assessment: - Intended as self study course but material can be used for instructor-led training - Free with no copyright issues - Useful material on introduction to electricity.

Electrical Meters

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Advanced Coach Electrical Theory and Maintenance – Part B	Utah Transit Authority (UTA)	Manual in PDF, copyright protected, 414 pages	See Introduction to Electricity above, Chapter 7
Welcome to ARAT Module One	NJT – New Jersey	PowerPoint, pages 39-56	See Introduction to Electricity above
THIRD PARTY MATERIAL			
Foundations of Electronics: Circuits & Devices, 4th Edition Russell L. Meade, Robert Diffenderfer	Delmar www.delmar.cengage.com	See Introduction to Electricity above	See Introduction to Electricity above
Electronic Principles, 7th Edition Albert Malvino, David J. Bates	www.go2atp.com	See Introduction to Electricity above	See Introduction to Electricity above
			Assessment: - Several instruction sheets on using a variety of electrical meters in pdf format for free download - See Tools and Materials Handling above
Fluke Corporation	www.us.fluke.com/	- Demos/Videos	**Overview/Objectives:**

Courseware Title	Source	Media	Notes
Education & Training Dept.		- Education Partnership - Electrical Measurement Safety - Training Center	Company offers a wide variety of instructional support to assist customers. **Assessment:** - Online virtual demonstrations of multimeter use are very useful - Free downloads - Can be useful to instructors – just like hands-on application without having to supply all students with actual meters and risk destroying some in the process

Wiring Technologies and Equipment

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Welcome to ARAT Module One	NJT – New Jersey	PowerPoint, pages 58-60	See Introduction to Electricity below
THIRD PARTY MATERIAL			
Commercial and Industrial Wiring Randy Barnett	American Technical Publishers www.go2atp.com	471 pages, soft cover textbook, $36	**Overview/Objectives** Covers topics specifically relating to the design and maintenance of commercial and industrial wiring systems. The main focus is on installing enclosures, conduit bodies, fittings, and wiring, and the procedures required to work on them safely. The book is designed around the latest technologies in service entrances, low-voltage systems, conductors and cables, and system designs. Review questions at the end of each chapter provide a variety of assessment opportunities. **Assessment:** - Offers wide range of technical training materials

Courseware Title	Source	Media	Notes
Navy Electricity and Electronics Training Series Module 4—Introduction to Electrical Conductors, Wiring Techniques, and Schematic Reading	Naval Education and Training Professional Development And Technology Center www.hnsa.org/doc/neets Approved for public release; distribution is unlimited	PDF available free online	**Overview/Objectives:** To introduce the student to the subject of Electrical Conductors, Wiring Techniques, and Schematic Reading. Material addresses conductor usage, insulation used as wire covering, splicing, termination of wiring, soldering, and reading electrical wiring diagrams. **Assessment:** - Intended as self study course but material can be used for instructor-led training - Free with no copyright issues - Useful material on wiring techniques (Chapter 2).

DC Fundamentals

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Advanced Coach Electrical Theory and Maintenance – Part B	Utah Transit Authority (UTA)	Manual in PDF, copyright protected, 414 pages	See Introduction to Electricity above, Chapter 8
THIRD PARTY MATERIAL			
AC/DC Principles Paul T. Shultz	American Technical Publishers www.go2atp.com	Textbook: 756 pages, $100	**Overview/Objectives:** Teaches how to apply basic laws and analysis techniques to introductory circuits as well as actual AC and DC circuit applications. Ohm's law Kirchoff's law, Thevenin's theorem, and Norton's theorem are also applied to basic circuits. Mathematics applied at various levels followed by step-by-step example problems. Text includes an introduction to concepts of electricity, network analysis techniques, vector diagrams and phase relationships, and concludes with chapters on

Courseware Title	Source	Media	Notes
			resonance, three-phase alternating current, transformers, and alternating current motors.
TPC Training Series Electrical Systems, TPC Series 200 Course 202: Batteries and DC Circuits	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $68 - On-Line $75	**Overview/Objectives:** Covers how electrochemical action is used. Covers batteries, electrolytic action, electroplating, Characteristics of storage batteries, application and maintenance of lead-acid, nickel-alkaline, and nickel-cadmium batteries, putting batteries into service, charging batteries, maintaining records, fundamentals of DC circuits, and using Ohm's Law to solve problems in DC series, parallel, and series-parallel circuits.
Course 206: DC Equipment and Controls	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $68 - On-Line $75	**Overview/Objectives:** Covers DC power applications in industry, types of DC generators, operating characteristics of DC motors, DC armature principles, and armature maintenance and repair. Includes types of DC relays, DC controllers, overspeed and overload protection, drum and reversing controllers, dynamic braking, DC power supplies, diodes, semiconductors, SCR principles, and DC maintenance practices. **Assessment:** - See other TPC assessments
Foundations of Electronics: Circuits & Devices, 4th Edition	Delmar www.delmar.cengage.com	See Introduction to Electricity above	See Introduction to Electricity above

Courseware Title	Source	Media	Notes
Russell L. Meade, Robert Diffenderfer			
Navy Electricity and Electronics Training Series Module 1, Introduction to Matter, Energy, and Electricity	Naval Education and Training Professional Development And Technology Center **www.hnsa.org/doc/neets**	See Introduction to Electricity above	See Introduction to Electricity above

AC Fundamentals

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Advanced Coach Electrical Theory and Maintenance – Part B	Utah Transit Authority (UTA)	Manual in PDF, copyright protected, 414 pages	See Introduction to Electricity above
THIRD PARTY MATERIAL			
AC/DC Principles Paul T. Shultz	American Technical Publishers www.go2atp.com	Textbook: 756 pages, $100	See DC Fundamentals above
Foundations of Electronics: Circuits & Devices, 4th Edition Russell L. Meade, Robert Diffenderfer	Delmar www.delmar.cengage.com	See Introduction to Electricity above	See Introduction to Electricity above
TPC Training Series Electrical Systems, TPC Series 200 Course 203: Transformers and AC Circuits	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $68 - On-Line $75	**Overview/Objectives:** Covers differences between DC and AC circuits. Explains AC sine wave, using vectors to solve AC problems, calculating impedance in circuits having inductance, capacitance, and resistance, AC power relationships in single-phase and three-phase circuits, and principles of transformer maintenance.

Courseware Title	Source	Media	Notes
Course 209: AC Control Equipment	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $68 - On-Line $75	**Overview/Objectives:** Covers the broad range of industrial motor starting and control equipment, including NEMA sizes and ratings. Includes pushbutton control stations, limit switches, mercury switches, mechanical and magnetic plugging, foot switches, and pressure, temperature, and float switches. Covers control panel wiring and special applications **Assessment:** - See other TPC assessments
AC Theory Textbook	National Joint Apprenticeship and Training Committee (NJATC) of National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW) www.njatc.org	Textbook, $47 Instructor Guide, $47 Student Workbook, $37 Instructor's Resource Kit, $99 Complete Set, $193	**Overview/Objectives:** This text builds upon the fundamentals of magnetism and proceeds to inductors, capacitors, and filters and their interaction in circuits. The effect that these components have on a circuit is related to using the principles of trigonometry. The AC Theory Resource Guide has been developed as an aid to the instructor while teaching the material. This resource guide contains a binder that includes an instructor guide and PowerPoint notes pages for each chapter. The resource guide also contains an e.resource™ CD which contains the instructor guide in PDF format, PowerPoint presentations for each chapter, and an image gallery containing all of the artwork and illustrations contained in the textbook.

Courseware Title	Source	Media	Notes
			Assessment: -
Navy Electricity and Electronics Training Series Module 2, Introduction to Alternating Current and Transformers	Naval Education and Training Professional Development And Technology Center **www.hnsa.org/doc/neets** Approved for public release; distribution is unlimited	PDF available free online	**Overview/Objectives:** Provides an introduction to alternating current (ac) and transformers, including basic ac theory and fundamentals of electromagnetism, inductance, capacitance, impedance, and transformers. **Assessment:** - See other assessments for Navy Electricity and Electronics Training Series

AC Motors, DC Motors, and Generators

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Advanced Coach Electrical Theory and Maintenance – Part B	Utah Transit Authority (UTA)	Manual in PDF, copyright protected, 414 pages	See Introduction to Electricity above
THIRD PARTY MATERIAL			
Foundations of Electronics: Circuits & Devices, 4th Edition Russell L. Meade, Robert Diffenderfer	Delmar www.delmar.cengage.com	See Introduction to Electricity above	See Introduction to Electricity above
AC Theory Textbook	National Joint Apprenticeship and Training Committee (NJATC) of National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW). www.njatc.org	See AC Fundamentals above	See AC Fundamentals above

Courseware Title	Source	Media	Notes
1) Motors Textbook 2) Motors Workbook	National Joint Apprenticeship and Training Committee (NJATC) of National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW). www.njatc.org	1) $57 2) $46	**Overview/Objectives:** 1) Textbook contains 19 chapters geared toward the theory, design, and installation of motors used in commercial and industrial locations. Covers DC, AC, Single-Phase, and Three-Phase motors. 2) Workbook covers the basic concepts and formulas that apply to electromagnetism and induction of motors. Includes Instructor and Student Guides. **Assessment:** - Appears comprehensive - NJATC offers many publications worth exploring
Navy Electricity and Electronics Training Series Module 5, Introduction to Generators and Motors	Naval Education and Training Professional Development And Technology Center **www.hnsa.org/doc/neets** Approved for public release; distribution is unlimited	PDF available free online	**Overview/Objectives:** Provides an introduction to generators and motors, and covers the uses of ac and dc generators and motors in the conversion of electrical and mechanical energies. **Assessment:** - See other assessments for Navy Electricity and Electronics Training Series

Introduction to Electrical Ladder Drawings

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
CQ310 and CQ311 Integrated	MARTA and Alstom	Schematics and	Rail applications

Courseware Title	Source	Media	Notes
Schematic Diagrams		diagrams	
THIRD PARTY MATERIAL			
Navy Electricity and Electronics Training Series Module 4—Introduction to Electrical Conductors, Wiring Techniques, and Schematic Reading	Naval Education and Training Professional Development And Technology Center **www.hnsa.org/doc/neets** Approved for public release; distribution is unlimited	PDF available free online	**Overview/Objectives:** To introduce the student to the subject of Electrical Conductors, Wiring Techniques, and Schematic Reading. Material addresses conductor usage, insulation used as wire covering, splicing, termination of wiring, soldering, and reading electrical wiring diagrams. **Assessment:** - Intended as self study course but material can be used for instructor-led training - Free with no copyright issues - Useful material on schematics but no mention of ladder diagrams.
Ladder Diagrams	All About Circuits www.allaboutcircuits.com	Website	**Overview/Objectives:** Provides basic explanation of ladder diagrams **Assessment:** - useful for basic explanation - free website

AC Circuit Analysis

Courseware Title	Source	Media	Notes
AGENCY MATERIAL			
Advanced Coach Electrical Theory and Maintenance – Part B	Utah Transit Authority (UTA)	Manual in PDF, copyright protected, 414 pages	
THIRD PARTY MATERIAL			
Foundations of Electronics: Circuits & Devices, 4th Edition	Delmar www.delmar.cengage.com	See Introduction to Electricity above	See Introduction to Electricity above

Courseware Title	Source	Media	Notes
Russell L. Meade, Robert Diffenderfer			
AC Theory Textbook	National Joint Apprenticeship and Training Committee (NJATC) of National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW). www.njatc.org	See AC Fundamentals above	See AC Fundamentals above

Semiconductor Fundamentals

Courseware Title	Source	Media	Notes
AGENCY MATERIAL (None)			
THIRD PARTY MATERIAL			
Foundations of Electronics: Circuits & Devices, 4th Edition Russell L. Meade, Robert Diffenderfer	Delmar www.delmar.cengage.com	See Introduction to Electricity above	See Introduction to Electricity above
Navy Electricity and Electronics Training Series Module 7—Introduction to Solid-State Devices and Power Supplies	Naval Education and Training Professional Development And Technology Center **www.hnsa.org/doc/neets** Approved for public release; distribution is unlimited	PDF available free online	**Overview/Objectives:** To introduce the student to the subject of Solid-State Devices and Power Supplies who needs such a background. Chapter 1 addresses semiconductors. **Assessment:** - See other assessments for Navy Electricity and Electronics Training Series

Courseware Title	Source	Media	Notes
TPC Training Series Series 250: Electronics Course 251: Semiconductors	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $54 - On-Line $75	**Overview/Objectives:** Covers the theory behind semiconductor operation. Describes the characteristics and operation of various diodes and transistors. Stresses the importance of proper environmental conditions and explains how to minimize electrostatic discharge (ESD) and radio frequency interference (RFI). Discusses printed circuit board (PCB) and integrated circuit (IC) technology, including connection and replacement methods. Identifies kinds of semiconductor packages. Explains how to interpret manufacturers' spec sheets and how to analyze circuit performance by Q points and characteristics. **Assessment:** - same for all TPC materials

Digital Fundamentals

Courseware Title	Source	Media	Notes
AGENCY MATERIAL (TBD)			
THIRD PARTY MATERIAL			
Digital Fundamentals Thomas L Flyod	Pearson Higher Education www.pearsonhighered.com Amazon Books www.amazon.com	Textbook, $131, also available used. 10th Edition also available	**Overview/Objectives:** Book has many diagrams that clearly illustrate the topics in each chapter. Each topic has its own exercises, and each exercise has solutions provided at the end of each chapter. Exercises improve understanding of the subject -- If you read and understand the examples, you can do the exercises. Also covers some digital technology, including the PLD.

Courseware Title	Source	Media	Notes
			Assessment: - Online reviewer says: "When I took digital design class, I struggled to find a book that is easy to understand. I tried to read several books, including Roth's book, all of them are hard to understand. Thankfully I bought Floyd's book and his book is the best digital design book I have ever read so far."
TPC Training Series Series 250: Electronics Course 291: Digital Logic Systems	Technical Publishing Company www.tpctraining.com	- Manual (English and Spanish) $54 - On-Line $75	**Overview/Objectives:** Covers the comparison of analog and digital switching circuits. Explains Boolean logic functions. Describes TTL and CMOS logic, as well as IC logic devices. Explains how flip-flops, clock circuits, counters, multiplexers, and memory circuits work. Describes the sections and interfaces in functional logic systems, including microprocessors. Describes proper methods for detection and correction of common fault potentials **Assessment:** - same for all TPC materials

Other Information

TPC On-the-Job-Training (OJT) & Assessments

TPC Training Systems offers 57 On-the-Job Training and assessment tools to help trainers evaluate and document completion of hands-on skill training requirements. Our OJT offerings ensure objective assessments of basic maintenance competencies by validating an individual's ability to satisfactorily perform assigned tasks.

Each assessment considers topics such as tool usage, safety, technique, material and component identification, inspection, selection, and replacement.