



Update: 10/1/01

TP77385 POWER TEST

Please fill out completely.

Name _____

QWEST ID Badge # _____ Expiration Date _____

SSN: _____

Date completed test: ___/___/___

Name of Service Supplier: _____

Current supervisor: _____

Address and e-mail: _____

Area of work (State) _____

Years of experience _____

Have you ever worked in a Qwest Central Office: yes_[]_ no_[]_

Qwest Representative space only.

- Number missed _____ Number of incorrect answers _____ Number of incorrect references _____
- Which test numbers had incorrect answers _____
- Which test numbers had incorrect references _____

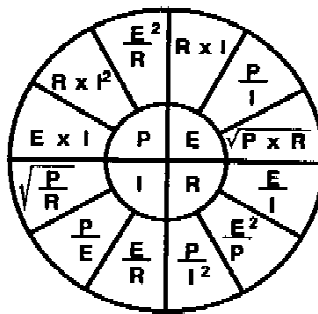
QWEST
Workmanship - Productivity - Process
Quality Assurance



Quality Process Management Team (QPMT)

Power Assessment Test (PAT)

Note: This test is composed of 5 - 20 question tests (Electronic Theory, Power Plants and systems, Grounding, Batteries, and Quality Requirements).



P = Watts I = amps
R = ohms E = volts

Section 1 - Electronic Theory

1. The unit of measurement for Electromotive Force is?
 - a. Ampere
 - b. Ohms
 - c. Watts
 - d. Volts
2. The unit of measurement for current flow is?
 - a. Volts
 - b. Amperes
 - c. Watts
 - d. Ohms
3. The unit of measurement for Resistance is?
 - a. Amperage
 - b. Capacitance
 - c. Voltage
 - d. Ohms
4. In a DC parallel circuit the voltage across the parallel branch elements is?
 - a. Determined by each branch's resistance.
 - b. Remains constant across all resistive elements.
 - c. Is dependent on the current flow through each circuit branch.
 - d. Divided by the resistive branch elements.

5. In a AC series circuit with 2 Amperes flowing and three resistors ($R_1=25$ ohms, $R_2 = 35$ ohms, $R_3 = 45$ ohms) what is the total applied voltage?
 - a. 70 Volts
 - b. 105 Volts
 - c. 210 Volts
 - d. 17.5 Volts

6. Which of the following formulas is correct?
 - a. $E=IR$
 - b. $I=E/R$
 - c. $P=IE$
 - d. All of the above.

7. In an inductive reactive circuit the _____.
 - a. Voltage lags the current
 - b. Voltage is in phase with the current
 - c. Voltage leads the current
 - d. Inductive reactance has no effect on this relationship.

8. In a capacitive reactive circuit the _____.
 - a. Voltage lags the current
 - b. Voltage is in phase with the current
 - c. Voltage leads the current
 - d. Inductive reactance has no effect on this relationship

8. Power is calculated using the following formula?
 - a. $P=EI$
 - b. $P=I^2R$
 - c. All of the above.
 - d. None of the above.

9. The term "MICRO" stand for a value of _____?
 - a. 10^{-9}
 - b. .000001
 - c. .0001
 - d. .0000001

10. The unit of measurement for power in an electrical circuit is?
 - a. Ampere
 - b. Watt
 - c. Ohm
 - d. Volt

11. Opposition to current flow in a DC circuit is termed what?
 - a. Resistance
 - b. Impedance
 - c. Reluctance
 - d. Conductance

12. Opposition to current flow in an AC circuit is termed what?
 - a. Resistance
 - b. Impedance
 - c. Reluctance
 - d. Conductance

13. If the voltage in either an AC or DC circuit is increased and nothing else is changed, the current flowing will?
 - a. Remain the same
 - b. Increase
 - c. Decrease
 - d. None of the above

14. If you needed to measure current flowing in a circuit you would use what?
 - a. Voltmeter
 - b. Ammeter
 - c. Wattmeter
 - d. Ohmmeter

15. An over-current protection device is?
 - a. A circuit breaker
 - b. A fuse
 - c. Neither A or B
 - d. Either A or B

16. In either an AC or DC circuit the current flowing under normal operating conditions is called?
 - a. Load current
 - b. Fault current
 - c. Null current
 - d. Primary current

17. In either an AC or DC circuit the current flowing during a short circuit is called?
 - a. Load current
 - b. Fault current
 - c. Null current
 - d. Primary current

18. The term HERTZ is used to describe what?
 - a. Frequency
 - b. Capacitance
 - c. Coulomb
 - d. Power factor

19. The term "KILO" stands for a value of?
 - a. 10,000
 - b. 1,000
 - c. 100
 - d. 10

20. The term "power factor" applies to what kind of circuit?
 - a. AC
 - b. DC
 - c. Both A and B
 - d. Neither A or B

Section 2 - Power Plants and Systems

1. Rectifiers change _____.
 - a. AC to DC
 - b. DC to AC
 - c. DC to DC
 - d. AC frequency
2. Converters change _____.
 - a. AC to DC
 - b. DC to AC
 - c. DC to DC
 - d. AC frequency
3. Inverters change _____.
 - a. AC to DC
 - b. DC to AC
 - c. DC to DC
 - d. AC frequency
4. Transformers change _____.
 - a. AC to DC
 - b. DC to AC
 - c. DC to DC
 - d. AC to AC
5. If you needed +48 Volts and you only had -48V which device would you most likely need?
 - a. Inverter
 - b. Rectifier
 - c. Converter
 - d. Transformer
6. What two Generator winding configurations are used today?
 - a. WYE/Star and Delta
 - b. 120V/240V
 - c. 120V/208V
 - d. Star and WYE
7. A three phase Generator would typically put out the following voltage?
 - a. 120/208V
 - b. 277/480V
 - c. either A or B
 - d. neither A or B
8. Which of the following type of pipe should be used in a Diesel engine fuel system?
 - a. Copper
 - b. Galvanized metal
 - c. Black Iron
 - d. PVC
9. Diesel engines typically have what type of fuel system?
 - a. Carburetor
 - b. Fuel Injection
 - c. Direct Induction
 - d. Vapor Phase

10. Phase conductor marking for 120/208V three phase conductors is?
 - a. Blue - phase 1 - Red - phase 2 Blue - phase 3 - White neutral - Green – ACEG
 - b. Black - phase 1 - Blue - phase 2 Red - phase 3 - White neutral - Green – ACEG
 - c. Red - phase 1 - Black - phase 2 Blue - phase 3 - White neutral - Green – ACEG
 - d. Black - phase 1 - Red - phase 2 Blue - phase 3 - White neutral - Green – ACEG
11. Phase conductor marking for 277/480V three phase conductors is?
 - a. Orange Phase 1 – Green Phase 2 – Blue Phase 3
 - b. Brown Phase 1 – Orange Phase 2 – Yellow Phase 3
 - c. Green Phase 1 – Blue Phase 2 – Red Phase 3
 - d. Brown Phase 1 – Yellow Phase 2 – Orange Phase 3
12. One major hazard associated with working around a typical –48V DC power plant is?
 - a. Electrical shock from touching a DC power bus.
 - b. Sharp objects normally found in a power room
 - c. Burns from contact with tools that get shorted between DC potentials
 - d. Battery fumes
13. You have a 50mv 200 Ampere shunt in a battery string. You measure the voltage drop across the shunt, and find it to be 37mv. How many amperes are flowing through the shunt?
 - a. 7.4 Amperes
 - b. 148 Amperes
 - c. 136 Amperes
 - d. None of the above
14. What happens if you ground the “TR” lead in a Rectifier?
 - a. Activates the unit.
 - b. The rectifier runs at 110% of capacity.
 - c. Rectifier shuts down.
 - d. Has no effect since this lead is not used.
15. When working on a piece of electrical equipment, who is the primary responsible person for ensuring that it is properly de-energized?
 - a. The site supervisor
 - b. The coverage person
 - c. The local safety person
 - d. The person doing the work
16. Lock out/tag out procedures are needed when?
 - a. Working on AC circuits only
 - b. Working on DC circuits only
 - c. Neither A or B
 - d. Either A or B
17. Two separate frame ground wires are required on which type of power bay?
 - a. Distribution
 - b. Rectifier
 - c. Battery stand
 - d. Monitor
18. When is it permitted to attach wires to electrical conduit?
 - a. Always
 - b. Never
 - c. When they are ground wires
 - d. When plastic tie wraps are employed

19. In an AC circuit, what is the minimum wire size that can be used when connecting in parallel?
 - a. #14
 - b. #6
 - c. 1/0
 - d. There is no minimum

20. When running an equipment ground wire in an electrical circuit, what determines the minimum size wire to be used?
 - a. The load
 - b. The size of the other wires
 - c. The distance
 - d. The size of the fuse or circuit breaker

21. Flexible metal conduit can be used in rooms containing storage batteries when?
 - a. Anytime
 - b. Never
 - c. Properly tied to the cable rack
 - d. Run in parallel

22. The term PDSC refers to what piece of electrical equipment in the building?
 - a. Fuse or circuit breaker bay dedicated to rectifiers
 - b. Fuse or circuit breaker bay dedicated to the switch
 - c. Fuse or circuit breaker bay dedicated to toll loads
 - d. Fuse or circuit breaker bay dedicated to lights

23. The term BDFB refers to what piece of electrical equipment in the building?
 - a. Fuse or circuit breaker bay dedicated to rectifiers
 - b. Fuse or circuit breaker bay dedicated to the switch
 - c. Fuse or circuit breaker bay dedicated to toll loads
 - d. Fuse or circuit breaker bay dedicated to lights

24. The three types of conductors used in the DC power arena are called?
 - a. Tip, ring and sleeve
 - b. Battery, return and ground
 - c. Line, neutral and ground
 - d. Phase A, B and C

25. Loads requiring protected AC power should be connected to?
 - a. The standby engine
 - b. A house services panel
 - c. A central office services panel
 - d. A UPS or inverter

26. Circuit breakers and fuses have to be rated for what?
 - a. Load current
 - b. Fault current
 - c. Voltage
 - d. All of the above

Section 3 - Grounding

1. The reason we ground equipment in our Central Offices is for?
 - a. Safety reasons
 - b. Equipment Protection
 - c. Equipment Operation
 - d. All of the above.
2. What type of grounding is used with electronic switching?
 - a. Floating array
 - b. Isolated Ground
 - c. Integrated Ground
 - d. Wheat Stone Bridge
3. Grounding conductors from major ground bars to the equipment frame shall be:
 - a. Designated at both ends showing reference to the other end.
 - b. Insulation shall be green in color.
 - c. Termination shall be clean and treated with an anti-corrosion inhibitor.
 - d. All of the above.
4. The QWEST recommended impedance of the ground electrode system shall be _____ ohms or less.
 - a. 25
 - b. 15
 - c. 5
 - d. 2
5. Grounding conductors shall have a minimum bending radius no less than?
 - a. 24 inches
 - b. 18 inches
 - c. 12 inches
 - d. 8 inches
6. The preferred "Grounding rods" used for QWEST Central Office Grounding systems shall be?
 - a. Copper clad
 - b. Galvanized metal
 - c. Black Iron
 - d. Stainless Steel
7. The preferred "Grounding connections" for areas that are exposed to the outside elements?
 - a. Exothermic Weld
 - b. Solder
 - c. Compression Crimp
 - d. Connection using anticorrosion inhibitor
8. The ACEG to Neutral bond should be made at the following location(s)?
 - a. All outlets, receptacles and lampholders
 - b. At all distribution panels
 - c. At the generator panel only
 - d. At the Main Service Panel
9. In a building 200 X 200 feet how many vertical Equalizers are required?
 - a. 1
 - b. 2
 - c. 3
 - d. 4

10. Multiple Switch's sharing the same power plant, shall be within ____ floor of the Ground Window?
 - a. 1
 - b. 2
 - c. 3
 - d. 4

11. BDFB feeders that share a power plant with an Isolated product are required to _____?
 - a. Bond the positive feeder to the Office Principle Ground Point
 - b. Bond the battery returns to the Horizontal Equalizer
 - c. Bond the battery returns to the Ground Window
 - d. Bonding is only required for feeder entering the isolated switch.

12. In a Central Office the size of the conductor that references the Main Distributing frame is?
 - a. 1/0
 - b. 2/0
 - c. 4/0
 - d. 250 Kcmil

13. Battery return conductors and grounding conductors shall be?
 - a. Green in color
 - b. Gray in color
 - c. Either green or gray
 - d. Battery returns are typically gray, and grounding conductors green

14. The two principal ground schemes used by QWEST are?
 - a. Obfuscated and collated
 - b. Logic and collated
 - c. Horizontal and vertical
 - d. Integrated and isolated

15. The copper bar located inside the ground window is called the?
 - a. Main ground bar
 - b. Battery term bar
 - c. Ground term bar
 - d. Main collection bar

16. Which of the following must be connected to ground?
 - a. The AC neutral
 - b. The positive side of the DC power
 - c. Both
 - d. Neither

17. The close encirclement of a ground wire by a ring of metal is called?
 - a. Girdling
 - b. Swaying
 - c. Compounding
 - d. Shunting

Section 4 - Batteries

1. What is the difference between a battery and a cell?
 - a. A battery produces a more continuous voltage.
 - b. A cell is comprised of batteries.
 - c. A battery is comprised of cells.
 - d. None of the above.
2. The installer shall insure at a minimum that the following items are on site and accessible prior to the start of any work involving batteries.
 - a. Goggles, Rubber Apron
 - b. Nitrile Gloves, Eye Wash Kit
 - c. Spill Cleanup Kit
 - d. All of the above
3. When replacing cells in an existing battery string the replacement cell(s) should?
 - a. Shall be manufactured by the same company.
 - b. Shall be of the Lead Antimony type.
 - c. Shall have the same number of plates and ampere-hour capacity.
 - d. Shall be meet zone 4 earthquake requirements, if installed in the heavy rated stand.
4. The recommended temperature for Lead Acid batteries is?
 - a. 77 Degrees F.
 - b. 50-60 Degrees F.
 - c. 85 Degrees F.
 - d. 50 Degree C.
5. New battery strings require that the installer complete a battery report. What should the installer do with the report after it is complete?
 - a. Discard it after the test turn up phase, because it has no value at that time.
 - b. Give it the Central Office Technician, or Power Technician responsible for the site.
 - c. Leave it in the Job Packet, and send a copy to the NROC.
 - d. Battery records need to stay with the battery string, until the string is retired.
6. Multiple string arrangements require that all stings are?
 - a. All strings are of the same type and manufacture.
 - b. All strings have the same Ampere-Hour rating.
 - c. All strings are connected in parallel.
 - d. All strings are charged at their particular rated float voltage.
7. The maximum temperature deviation across a battery string shall not exceed _____ degrees?
 - a. 25 Degrees F.
 - b. 5 Degrees F.
 - c. 10 Degrees F.
 - d. 2 Degrees F.
8. Cleaning of battery cases can be accomplished by washing them with _____?
 - a. A mild ammonia solution.
 - b. Distilled Water
 - c. Any petroleum based cleaner.
 - d. A mild dishwasher soap.
9. Battery Flame arrestors are only required during?
 - a. Normal operation, never during the initial charge cycle.
 - b. Only during the initial charge cycle.
 - c. Only during the intercell connection phase of the job.
 - d. During all phases of the installation, and during he entire life of the cell.

10. All Flame arrestors should be equipped with?
 - a. Dust Covers
 - b. Thermometers.
 - c. Resonators.
 - d. Air Vents.

11. Installer should avoid making connections, working on or near cell, or use of open flame until the battery has been floated or open circuit for _____ hours.
 - a. 12 Hours
 - b. 24 Hours
 - c. 36 Hours
 - d. 48 Hours 77350 10.5.2

12. The installer is required to do the following during the initial battery charge cycle?
 - a. Post a sign that says "Warning" Battery gases are explosive! No sparks or open flames near cells.
 - b. Ensure that there is sufficient ventilation.
 - c. All of the above.
 - d. Reference the Positive post to the office grounding system.

13. The installer should clean and neutralize the battery posts, before applying any type of corrosion inhibitor. The installer shall apply the corrosion inhibitor per the following:
 - a. Apply NO-Oxide A after it has been heated according to manufactures specifications.
 - b. Apply No-oxide A Special cold, because it has special thinners that eliminate the need for heating.
 - c. Apply only the battery manufactures recommended products using their application recommendations.
 - d. Kero Syrup works just fine, and it has been approved by QWEST.

14. How many individual cells are needed to make one "48V" string?
 - a. 12
 - b. 24
 - c. 36
 - d. 48

15. The requirement for tightening bolts on a battery post would be?
 - a. Use torque values supplies by manufacturer
 - b. Tighten just as hard as you can
 - c. There are none
 - d. Finger tight

16. The first and last cell of a battery string?
 - a. Should be next to each other
 - b. Should be on different stands
 - c. Have no requirements
 - d. Should not be next to each other

Section 5 - Quality Requirements

1. AC wiring splices (wire nut connections) can be used where?
 - a. Junction box, conduit box, or pull box
 - b. Neatly in the rear of cable ways
 - c. Taped and put on cable racks
 - d. None of the above
2. When installing an AC circuit the neutral conductor shall be identified in what color?
 - a. Green
 - b. Yellow
 - c. White or gray
 - d. Blue (black)
3. What is the QWEST grounding "Technical Publication"?
 - a. TP 77350
 - b. TP 77351
 - c. TP 77355
 - d. TP 77367
4. What is the minimum wire size to ground each frame, bay or cabinet?
 - a. #8 AWG
 - b. #4 AWG
 - c. #6 AWG
 - d. #2 AWG
5. Equipment in the integrated ground plane located within _____ feet of equipment of the isolated ground shall be bonded to the "MGB" within the ground window?
 - a. Ten feet
 - b. Six feet
 - c. Does not matter
 - d. Frame ground and chassis grounds
6. When making ground connections the contact surface shall require?
 - a. No additional effort is required
 - b. Installer shall use cleaning fluid
 - c. Be cleaned and treated with a non-oxidizing agent
 - d. Shall be sanded or abraded before connecting.
7. In QWEST equipment facilities combustible materials shall be removed or placed in a metal enclosure on a:
 - a. Daily Basis.
 - b. Weekly Basis
 - c. Monthly basis
 - d. When the job is complete.
8. Cable penetrations shall be closed using methods defined in the QWEST Technical Publication 77350.
 - a. The only approved method is the permanent closure method.
 - b. You don't need to close wall or floor penetrations until the cabling effort has been completed.
 - c. You should close the penetration with a temporary closure method (Green), until the cabling operation is done, and then use the (Red) final closure method.
 - d. Only certified fire protection specialist, are qualified to close floor and wall penetrations.
9. The distance between the cable insulation, and the barrel of a lug, shall not exceed?
 - a. 3/4 Inch
 - b. 1/2 Inch
 - c. 1/4 Inch
 - d. 1/8 Inch

10. The end of a 750 kcmil cable shall be within _____ of the end of the lug.
 - a. 1/4 Inch
 - b. 1/2 Inch
 - c. 3/8 Inch
 - d. 1/12 Inch

11. Battery strings shall be designated to show their installed date?
 - a. At the "Temperature Reference Cell".
 - b. Any location's centered on both sides of the string.
 - c. At cell number 24.
 - d. At cell number 1.

12. Any field installed heat shrink applications made to cables or connectors above offices batteries shall be of what type?
 - a. Hermetically factory sealed only
 - b. Black heat shrink
 - c. Clear heat shrink
 - d. Heat shrink is not allowed around battery cells.

13. Labeling requirements for new power plants, engines, and BDFB's can be found in what QWEST Technical Publication?
 - a. 77355
 - b. 77369
 - c. 77385
 - d. 77350

14. Spare "Dummy" fuses are required when?
 - a. Anytime the circuit is unassigned and the fuse is not inserted.
 - b. Only when the dummy fuse is required as a tensioning unit for the fuse holder.
 - c. Never required
 - d. Always required.

15. All metallic components in an engine room need to be bonded and grounded. What is the minimum wire size for the grounding conductor from the Central Office Ground Bar feeding the engine room?
 - a. 1/0
 - b. #6 AWG
 - c. 750 kcmil
 - d. #2 AWG

16. Who is your contact when you have questions about quality issues on a power job.
 - a. Network Reliability Operations Center (NROC)
 - b. Corporate quality auditor for your area.
 - c. Any Operations Manager
 - d. Design Engineer

17. Electric panel covers need to be replaced?
 - a. At the end of the job
 - b. At the end of the workday
 - c. At the end of the week
 - d. At the end of the month

18. If an existing circuit rated at 20 amperes needed to be enlarged to 40 amperes, the correct method would be to?
 - a. Install a new 40 ampere circuit and cut the load to it
 - b. Install a second 20-ampere fuse or circuit breaker and connect in parallel
 - c. Change the fuse or circuit breaker to 40 amperes
 - d. Add more wire to increase current flow

19. When adding in a fuse or circuit breaker in a circuit it shall be sized?
- a. Equal to or larger than any downstream protection
 - b. Equal to or smaller than any upstream protection
 - c. Both A and B
 - d. Neither A or B

THANK YOU AND GOOD LUCK!!!