



Apprentice Telecommunications Technician Test (CTT)

Study Guide

**Study Guide for
Pacific Gas & Electric Company
Apprentice Telecommunications Technician
Qualifying Test
(CTT)**

About the Test

The test consists of 36 questions with multiple choice answers to be completed within a 3½ hour time limit. A passing score is 26 questions answered correctly. Questions emphasize electronic circuit analysis and problem solving (not too heavy on math). A scientific calculator is the only material permitted.

This test allows you to demonstrate your knowledge and understanding of the fundamentals of basic electricity and electronics as well as your preparedness for advance technical training in complex communications systems that are maintained and operated by highly-skilled Telecommunications Technicians.

References

Many excellent basic electricity and electronics reference books are available from libraries, bookstores, college bookstores, on-line resources, and friends. Thousands have been published—electronics and its principles are governed by the laws of physics not the author. This generally makes all electronics technical books appropriate for the subject matter they are covering.

A general reference book is always invaluable as a supplement to other textbooks from classes or specific subjects, and as an instrument for general review in preparing for qualifying tests. However, they are not substitutes for extensive formal education and training in basic electricity and basic electronics.

Material Covered in the Test

I. Basic Electricity

- A. Electrical Units of Measure (Voltage, Current, Resistance, Power)
- B. AC and DC Series and Parallel Circuits
- C. Ohm's Law and Calculations

II. Basic Electronics

- A. Electronic Components (All Types)
 - 1. Reactive/Non-Reactive Components
 - a. Resistors, Inductors, Capacitors
 - b. Resonance
- B. Electronic Circuits (Recognition - Theory of Operation - Analysis)

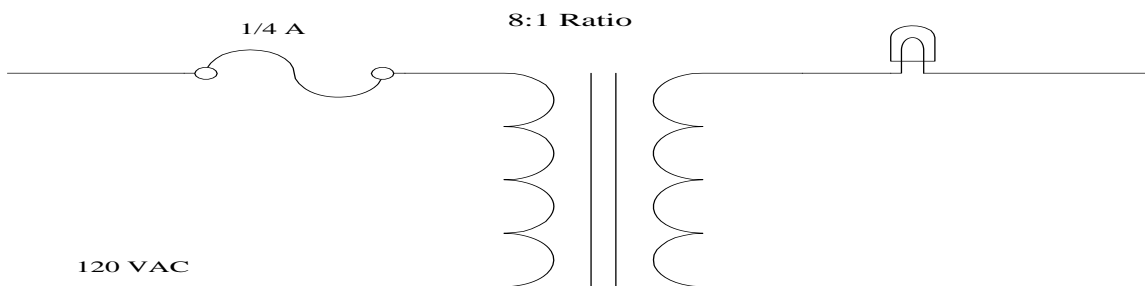
Material Covered in the Test (continued)

III. Digital Electronics

- A. Numbering Systems using Hexadecimal, Binary, and Binary Coded Decimal.
- B. Basic Logic Circuits
 - 1. Logic Gates
 - 2. Truth Tables

Sample Test Questions

These sample test questions are included to give you an idea of the kind and types of questions you can expect to find on the qualifying test. These questions do not appear in the actual test, but the nature and difficulty are representative of the ones on the qualifying test. Try completing these questions as a self-test to evaluate your general knowledge of electronics and preparedness for qualifying for the Apprentice Telecommunications Technician Program. (Answers to questions are on the last page of this Study Guide)



- 1) You have a box of various wattage incandescent lamps of the correct voltage for the circuit above. The box contains lamps of 10 watts, 20 watts, 35 watts, 50 watts, and 100 watts. Select the largest wattage lamp that can be used without exceeding the fuse rating in the primary.
- A) 10 watt
 - B) 20 watt
 - C) 35 watt
 - D) 50 watt
 - E) 100 watt
 - F) Any 15 volt lamp will be OK
 - G) Not enough information given

2) In a series circuit with unequal resistances (choose the correct answer):

- A) The lowest resistance has the highest voltage
- B) The highest resistance has the highest voltage
- C) The lowest resistance has the most current
- D) The highest resistance has the most current

3) In a parallel circuit with unequal branch resistances (choose the correct answer):

- A) The current is highest in the highest resistance
- B) The current is equal in all the branches
- C) The voltage is highest across the lowest resistance
- D) The current is highest in the lowest resistance

4) 161 decimal is _____ in binary, _____ in hexadecimal.

- A) 10100011, 091
- B) 10100001, 0A1
- C) 10101001, 0B1
- D) 10101101, 091
- E) 10100001, 0A0

5) Determine the total resistance (R_T) and total current (I_T) in the circuit below?

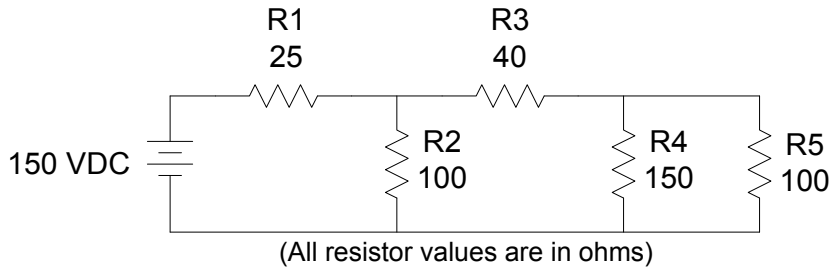
A) $R_T = 415 \Omega$; $I_T = 2.8 \text{ A}$

B) $R_T = 103 \Omega$; $I_T = 1.5 \text{ A}$

C) $R_T = 75 \Omega$; $I_T = 2.0 \text{ A}$

D) $R_T = 150 \Omega$; $I_T = 1.0 \text{ A}$

E) $R_T = 75 \Omega$; $I_T = 3.0 \text{ A}$



6) In a series AC circuit, $X_L = 2350 \text{ ohms}$, $C = 0.005 \mu\text{F}$, and $R = 500 \Omega$. What is the impedance at resonance?

A) The frequency must be known.

B) $2.1 \text{ K}\Omega$

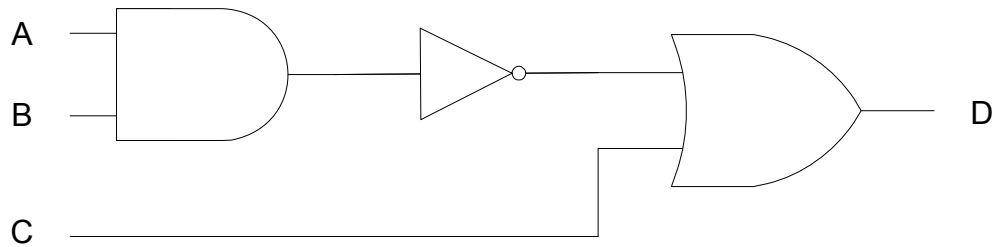
C) 4200Ω

D) $0.5 \text{ K}\Omega$

E) $1.85 \text{ K}\Omega$

7) Which is the correct equation for the logic diagram shown below?

- A) $\bar{A} + \bar{B} + C = D$
- B) $A + B \cdot C = D$
- C) $A + B + \bar{C} = D$
- D) $A \cdot B + C = D$

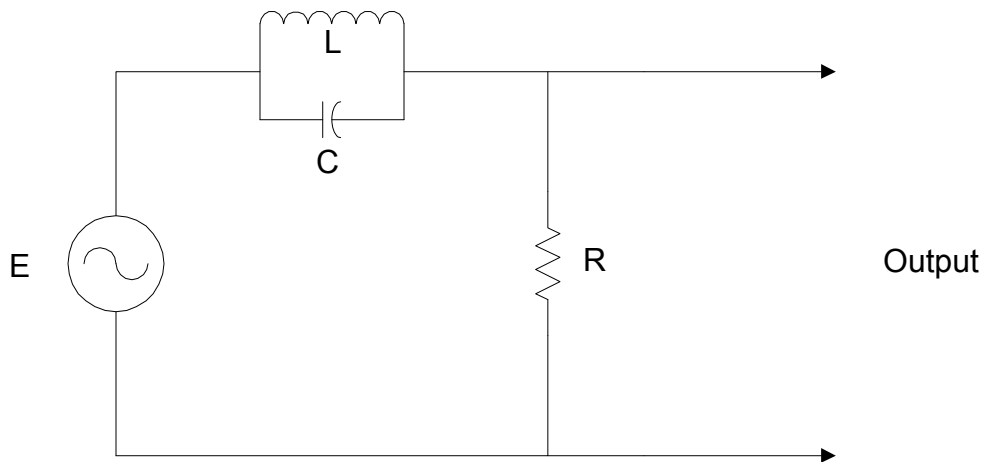


8) A 10 mH coil has a resistance of 100 ohms. At what frequency does $X_L = R$?

- A) 15915.5 Hz
- B) 7957.7 Hz
- C) 31830.9 Hz
- D) 1591.5 Hz

9) In the circuit shown below, the source frequency is below the resonant frequency of L and C. If this frequency is now gradually increased through resonance without changing the amplitude of E, the voltage at the output would:

- A) Decrease at first and then increase.
- B) Increase at first and then decrease.
- C) Decrease continuously.
- D) Increase continuously.
- E) Remain constant.



10) When observing a 500 KHz square wave with an oscilloscope, what period would you expect to see? (For a full cycle)

- A) 5 microseconds
- B) 200 nanoseconds
- C) 2 microseconds
- D) 200 nanoseconds
- E) It depends on the amplitude

Answers to sample test questions:

- 1) B
- 2) B
- 3) D
- 4) B
- 5) C
- 6) D
- 7) A
- 8) D
- 9) A
- 10) C