Apprentice Metering Systems Technician Test (AMT)

Preparation Guide

APPRENTICE METERING SYSTEMS TECHNICIAN TEST (AMT)

About the Test

There are 80 questions. The total amount of time allowed for the test is 4 hours. Seventy percent (70%) score is required to qualify.

There are two parts to this test 1) Eighteen (18) math questions and 2) Sixty-two (62) mixed questions on basic electricity and electronics. Candidates are allowed 1.5 hours to complete the math portion without the aid of a calculator and 2.5 or more hours (depending the time used for the math portion) for basic electricity and electronics portion with calculators. The math portion will be administered first. Once the testers turn in the math portion, they will receive the second portion, basic electricity and electronics. Testers will not be allowed to return to the math portion once it has been turned in.

This test allows you to demonstrate your knowledge and understanding of the fundamentals of basic electricity, electronics and mathematics as well as your preparedness for advanced technical training.

References

Although there are no education requirements, it is highly recommended that all candidates be thoroughly familiar with:

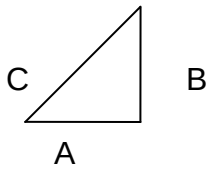
(1) Basic Electricity (AC and DC) and Basic Electronics
(2) Mathematics (Algebra and Basic Trigonometry)

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. Additional resources for improving understanding of the concepts listed above may be found at your local libraries and bookstores.

We hope you find this information helpful. Make sure that when you are scheduled to take the test you are physically and mentally alert and ready to do your best, or you should reschedule your appointment.

Pacific Gas and Electric Company wishes you the best of luck in qualifying on our test.

1. For the triangle shown, if A = 8 and B = 6, find C



(a) 9
(b) 10
(c) 14
(d) 15
(e) 16

2. A car averages 15 miles per gallon of gas in city driving and 20 miles per gallon in highway driving. At these rates, how many gallons of gas will the car use on a 600 mile trip if 4/5 of the trip is highway driving and the rest is city driving?

(a) 24
(b) 32
(c) 40
(d) 44
(e) 60

3. If $8(x - 1) - 4x = 16$, then $x =$

(a) 4
(b) 6
(c) 11
(d) 13
(e) 16

4. Which of the following is equal to $\frac{200 + n}{50}$

(a) $8\frac{+ n}{10}$
(b) $\frac{20 + n}{5}$
(c) $4n$

(d) $4 + n$

(e) $4 + \frac{n}{50}$

5. If $su^3t^4 > 0$, which of the following products must be positive?

(a) su
(b) st
(c) ut
(d) sut
(e) su^2

6. A 6-microfarad capacitor and a 4-microfarad capacitor are connected in parallel across a 50-v, 100-HZ source. Determine the:

   (a) Total capacitance =

   (b) Total reactance =

   (c) Total current =

7. T F A potential difference between two points is called **a** power.

8. T F For a given weight and size, a capacitor stores more energy than a battery.

9. What is the resistance of a lamp which draws 250 milliamperes when connected to a 12.6 volt battery?

10. A toaster draws 10 amps from a 120 volt source, how much energy would it cost to operate the toaster in 2 hours, if energy cost 10 cents per Kwh?

11. The base unit of energy is the

   (A) Ion
   (B) Proton
   (C) Joule
   (D) Pound

12. A 30 ohms load is connected to the 6 volt secondary of a transformer with a 120 volt primary, what ohmic value does the load appear to be to the source?

13. T F Reducing the inductance in a series RL circuit causes the true power to increase.

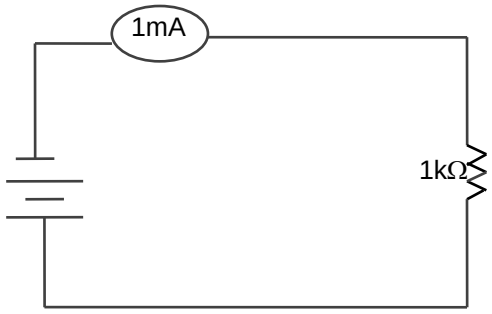
14. At resonance, the Power Factor of a circuit is _____.

15. Draw two capacitors in series.

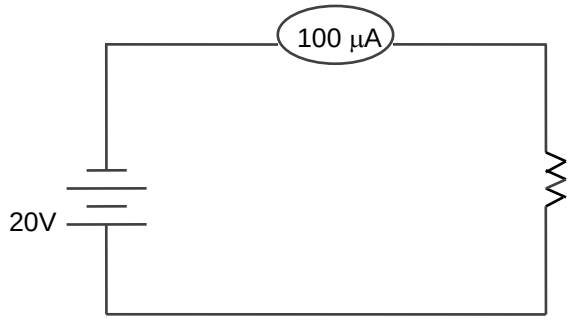
16. Three capacitors of 11 pf, 22 pf, and 33 pf are connected in series. Find the total capacitance? _____

17. Find the reactance Xc for a 100 microfarad capacitor when the frequency is 60 H_Z ? _____.

18. Solve for Voltage. Ans. _____



19. Solve for Resistance Ans. _____



20. A current of 1 ampere splits between 10Ω and 20Ω resistors in parallel. Find the current through each? $I_{10\Omega}$_____, $I_{20\Omega}$_____.

Answers to the Sample test questions

1. B

2. B

3. B

4. E

5. A

6. Total C = 10 μf, Total Reactance = 159 ohms,
Total Current = 0.314A or 314 milliamps.

7. F

8. F

9. 50.4 ohms

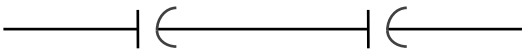
10. 24 cents

11. C

12. 12000 ohms

13. T

14. Unity or 100% P.F.

15 

16. 6 pf

17. 26.5 ohms

18. 1 volt

19. 200 Kohms

20. $I_{10\Omega}$ = 0.667 amps or 667 milliamps $I_{20\Omega}$= 0.333 amps or 333 milliamps.

Solutions to Mathematical Questions:

1. $C^2 = a^2 + b^2$

   $C = \sqrt{8^2 + 6^2}$

   $C = \sqrt{100}$

   $C = 10$

2. 4/5 x 600 miles = 480 miles of highway driving
   1/5 x 600 miles = 120 miles of city driving
   480/20 miles per gallon = 24 gallons highway driving
   120/15 miles per gallon = 8 gallons city driving
   Total gallons used is 24 + 8 = 32 gallons

3. $8(x-1) - 4x = 16$
   $8x - 8 - 4x - 16 = 0$
   $4x = 24$
   $x = 6$

4. $\frac{200}{50} + \frac{N}{50}$

   $4 + \frac{N}{50}$

5. If $su^3t^4 > 0$, which of the following products must be positive?

T can be + or – and T^4 would always be + so T is not part of the answer. Eliminate (B,C and D). E doesn't work because U could be -1 and S could be -1, then $SU^2 = -1(-1)^2 = -1$ but SU^3 would $-1\ (-1)^3 = +1$.

(a) SU

6. a) 6 microfarad + 4 microfarad = 10 microfarad

b) $X_c = \frac{1}{2\Pi FC}$

$= \frac{1}{2\ (\Pi)\ (100)\ (10 \times 10^{-6})} = 159.23$ ohms

Total Reactance = 159 ohms, Total current = E/Z = 50v/159 ohms = 0.314 amps or 314 milliamps

7. F

8. F

9. $R = \frac{E}{I} = \frac{12.6}{.25} = 50.4$ ohms

10. Energy in Kwh = $\frac{P \times T}{1000}$

$\frac{120 \times 10 \times 2hrs}{1000}$ = 2.4 kwh x .10/kwh = 24 cents

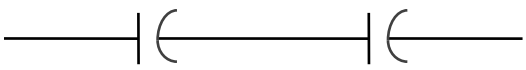
11. C

12. $I_{sec} = E_{sec} \div R$ 6v ÷ 30 ohms = .2 amps

$R_{pri} = E_{pri} \div I_{pri}$ = 120v ÷.2/TR = 120v. ÷2 / 20= 120v ÷ .01 = 12000 ohms

13. T

14. Unity or 100% p.f.

15 

16. Total capacitance = $\frac{1}{\frac{1}{11pf} + \frac{1}{22pf} + \frac{1}{33pf}}$ = 6 pf

17. Total reactance = $\frac{1}{2 \Pi F C} = \frac{1}{2 (\Pi) (60) (100 \times 10^{-6})}$ = **26.5 ohms**

18. E = I x R = .001 x 1000 = 1 volt

19. R = E ÷ I = 20 ÷ 100 x 10^{-6} = 200 kilo ohms

20. Req = $\frac{R_1 x R_2}{R_1 + R_2} = \frac{200}{30}$ = 6.6667 ohms

Et = It x Rt = 1a x 6.6666 ohms = 6.6667 v
$I_{10\Omega}$ = Et ÷ $R_{10\Omega}$ = 6.666v ÷ 10Ω = .6667 amps or 667 milliamps
$I_{20\Omega}$ = Et ÷ $R_{20\Omega}$ = 6.666v ÷ 20Ω = .3333 amps or 333 milliamps