

ENVECO CONTINUING PROFESSIONAL EDUCATION COURSES
for
TEXAS PROFESSIONAL ENGINEERS

COURSE GUIDE

for

Course TX-PE-56
The International System of Units (SI)
Recommended PDH - 5

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Introduction

This course guide has been prepared for your use in completing the subject course **TX-PE-56 The International System of Units (SI)**. It has been designed to help the professional engineer in Texas gain an understanding of changes in the SI system in recent years and to maintain currency with its current form..

The companion reading material noted below is available free of charge at:

<https://doi.org/10.6028/NIST.SP.330-2019>

- The International System of Units (SI), NIST Special Publication 330 2019 EDITION, August 2019, 122 pages

We suggest that you do the following to complete the course:

For each section:

- read the learning objectives for a section of this guide
- complete the reading assignment for that section as indicated in this guide
- answer the questions for that section as found in this guide on the answer sheet

When completed:

- make note of the “pass code” indicating successful completion of this course; complete additional course(s) as appropriate, recording “pass codes” for those courses, then use those codes and your Texas PE number and return to <http://jamikus.com/enveco/pecourses/index.html> to pay the enrollment fee and print out your certificates of completion

Section 1 - Introduction

Learning Objectives

The following are the learning objectives for this section:

- to review the fundamental defining constants and the SI units

Reading Assignments

- read **Foreword** and **The BIPM and the Meter Convention** pp. iii-vii, **Preface** pp. xi-xii, **1. Introduction** pp.1-2

Questions

1. The BIPM was originally concerned with _____, and to _____ .
 - A. measurements of length and mass
 - B. time scales
 - C. metrological studies in relation to length and mass.
 - D. A, B
 - E. A, C
2. The International System of Units, the SI, was established in 1960.
 - A. True
 - B. False
3. The seven current base units of the SI are the bases of derived units (which are constructed as products of powers of the base units).
 - A. True
 - B. False

Section 2 - The International System of Units

Learning Objectives

The following are the learning objectives for this section:

- to understand the basics of the SI: units defined

Reading Assignments

- read **2. The International System of Units**, pp 3-22.

Questions

4. Reporting a measurement result of a quantity requires reporting the estimated value of the _____ and the _____ associated with that value, _____ .
- A. quantity to be measured, uncertainty, with only the quantity to be measured having units
 - B. quantity to be measured, uncertainty, both expressed in the same unit
 - C. quantity to be measured, precision, with only the quantity to be measured having units
 - D. quantity to be measured, uncertainty, both expressed in the same unit
 - E. none of the above
5. Each of the seven fundamental constants are expressed as the product of a number and a unit.
- A. True
 - B. False
6. For each SI value of a _____, when fixing the exact numerical value the unit is therefore defined because the product of the numerical value and the unit must equal the _____, which by definition is _____.
- A. fundamental constant, value of the constant, variable
 - B. fundamental constant, value of the unit, invariant
 - C. fundamental constant, value of the constant, invariant
 - D. derived constant, value of the constant, invariant
 - E. none of the above
7. The International System of Units, the SI, consist of the seven defining constants: 1) hyperfine transition frequency of Cs, 2) speed of light in vacuum, 3) Planck constant, 4) elementary charge, 5) Boltzmann constant, 6) Avogadro constant, and 7) luminous efficacy.
- A. True
 - B. False

8. There are 22 coherent derived units with special names, and with the seven base units they form the core of the set of SI units. Some of the special named units of derived quantities include:
- A. radian, steradian, hertz, newton, pascal, joule, watt
 - B. coulomb, volt, farad, ohm, siemens
 - C. weber, tesla, henry degree Celsius, lumen, lux, becquerel, gray, sievert, katal
 - D. A, B, and C

Section 3 - Multiples, Non-SI Units, and Symbols and Names

The following are the learning objectives for this section:

- to understand the specific usage of accepted reference and writing standards for SI unit multiples, use of non-SI units and symbols and names

Reading Assignments

- read **3. Decimal multiples and sub-multiples of SI units** pp. 23-24, **4. Non-SI units that are accepted for use with the SI** pp. 25-27, and **5. Writing unit symbols and names, and expressing the values of quantities** pp 29-35.

Questions

9. Decimal multiples and submultiples ranging from _____ are used with the SI units.
- A. 10^{10} to 10^{-10}
 - B. 10^{15} to 10^{-15}
 - C. 10^{20} to 10^{-20}
 - D. 10^{24} to 10^{-24}
 - E. 10^{30} to 10^{-30}
10. Prefix names are inseparable (forming a single word) from the unit names to which they are attached. An example or examples of a correct application(s) of this would be:
- A. 10^3 ton would be kiloton
 - B. 10^6 ohm would be gigaohm
 - C. 10^{-3} pascal would be micropascal
 - D. none of A,B, or C are correct
 - E. A, B, and C are all correct
11. Some non-SI units are widely used, accepted for use with the SI by the CIPM, and are expected to be used for many years, such as "hour"
- A. True
 - B. False
12. An exception to symbols being printed in upright type in lower-case letters is that for the liter — which is that either capital L or lower case l can be used in order to avoid possible confusion between the numeral 1 (one) and the lower-case letter l (el).
- A. True
 - B. False

13. For numbers with many digits the digits may be divided into groups of _____ by a space, in order to facilitate reading without inserting either dots or commas between the spaced groups. However, when there are only _____ digits before or after the decimal marker, it is customary not to use a space to isolate a single digit.
- A. two, four
 - B. two, five
 - C. three, four
 - D. three, five
 - E. none of the above
14. The standard uncertainty associated with a quantity x is denoted by $u(x)$.
- A. $del(x)$
 - B. $u(x)$
 - C. $u(del x)$
 - D. $unc(x)$
 - E. none of the above
15. When multiplying numbers the following method should be used:
- A. $a \times b$
 - B. ab
 - C. a/b
 - D. a^b
 - E. none of the above
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When you are ready to have your quiz scored, click on this button (you can do this more than once) ->

Results and Correct Answers

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Correct Answer															

When you have passed, enter your Texas PE number below to get an automatically generated PassCode:

PE Number _____ Your **PassCode** for course **TXPE56** is _____

(When you complete final enrollment at our website by paying the fee you will be prompted for Pass Codes to confirm successful completion of courses.)