ISET-1000: NUMERICAL APPLICATIONS IN ELECTRICAL AND MECHANICAL MAINTENANCE

Cuyahoga Community College

Viewing: ISET-1000 : Numerical Applications in Electrical and Mechanical Maintenance

Board of Trustees:
September 2023

Academic Term:
Fall 2024

Subject Code
ISET - Integrated Systems Engineering

Course Number:
1000

Title:
Numerical Applications in Electrical and Mechanical Maintenance

Catalog Description:
Essential math concepts and how they are applied on the job in alternative energy, boiler operation, construction, electrical, HVAC, manufacturing, maintenance, mechanical, pipefitting, plumbing, and welding areas. Teaches applied numerical concepts in visual steps and includes both math exercises and practical applications that reinforce learning.

Credit Hour(s):
2

Lecture Hour(s):
2

Requisites

Prerequisite and Corequisite
Departmental approval.

Outcomes

Course Outcome(s):
Apply measurement conversions, formulas/equations, and geometric principles to electrical and mechanical maintenance activities.

Objective(s):
1. Use and apply whole numbers, integers and decimals in electrical and mechanical maintenance job tasks.
2. Describe basic electrical and mechanical measurement systems and conversions.
3. Perform U.S. customary system and metric system conversions as applied to shop tasks.
4. Apply basic electrical and mechanical formulas and equations to shop tasks.
5. Learn basic electrical and mechanical applications of percentages and ratios.

Course Outcome(s):
Demonstrate how electrical and mechanical technicians use math on the job while applying math principles in an electrical and mechanical context.

Objective(s):
1. Use simple and complex fractions while working with tolerances for calculating the size of parts and sawing bar stock.
2. Read and interpret fractional/decimal steel rules in different scales.
3. Apply principles of percentages and decimals while working with micrometers and Vernier scales for determining dimensions.
4. Demonstrate ability to work with decimal tolerances on blueprints and convert fractions to decimals on a technical drawing.

5. Apply ratios and proportions to gear ratios, scales, RPM, etc.
6. Perform conversions within the metric system to calculate metric weight of a part(s) based on weight of material in cubic inches.
7. Apply shop trigonometry for solving for missing side of right triangle and hole locations on bolt circles.
8. Describe angularity calculations using a sine bar and gage block.

Methods of Evaluation:
1. Tests
2. Quizzes
3. Homework
4. Projects

Course Content Outline:
1. Arithmetic of whole numbers
    a. Reading, writing, rounding and adding whole numbers
    b. Subtraction of whole numbers
    c. Multiplication of whole numbers
    d. Order of operations
2. Fractions
    a. Working with fractions
    b. Multiplication of fractions
    c. Division of fractions
    d. Addition and subtraction of fractions
3. Decimal numbers
    a. Addition and subtraction of decimal numbers
    b. Multiplication and division of decimal numbers
    c. Decimal fractions
4. Ratio, proportion, and percent
    a. Ratio and proportion
    b. Special applications of ratio and proportion
    c. Introduction to percent
    d. Percent problems
    e. Special applications of percent calculations
5. Measurement
    a. Working with measurement numbers
    b. U.S. customary units and unit conversions
    c. Metric units
    d. Metric - U.S. customary conversions
    e. Direct measurements
6. Pre-algebra
    a. Addition of signed numbers
    b. Subtraction of signed numbers
    c. Multiplication and division of signed numbers
    d. Exponents and square roots
7. Basic algebra
    a. Algebraic language and formulas
    b. Adding and subtracting algebraic expressions
    c. Solving simple equations
    d. Solving two-operation equations
    e. Solving more equations and solving formulas
    f. Solving word problems
    g. Multiplying and dividing algebraic expressions
    h. Scientific notation
8. Practical plane geometry
    a. Angle measurement
    b. Perimeter of polygons and area of quadrilaterals

c. Triangles, regular hexagons, and irregular polygons
d. Circles
9. Solid figures
a. Prisms
b. Pyramids and frustums of pyramids
c. Cylinders and spheres
d. Cones and frustums of cones
10. Triangle trigonometry
a. Angles and right triangles
b. Trigonometric ratios
c. Solving right triangles
d. Oblique triangles

Resources

Saunders, Hal M. *Mathematics for the Trades: A Guided Approach*. 11th ed. Pearson, 2019.

Washington, Allyn J. *Basic Technical Mathematics with Calculus*. 12th ed. Pearson, 2023.

Weston, Melissa D. and Patrick J. Klette. *Electrical Math Principles and Applications*. 1st ed. ATP, 2021.

Peterson, John C. and Robert D. Smith. *Mathematics for Machine Technology*. 8th ed. Cengage, 2019.

Marion, Nino. *Math for Welders*. 7th ed. Goodheart-Wilcox, 2023.

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