AUTO-1050: NUMERICAL APPLICATIONS IN AUTOMOTIVE SERVICE

Cuyahoga Community College

Viewing: AUTO-1050 : Numerical Applications in Automotive Service

Board of Trustees:
MAY 2025

Academic Term:
Fall 2025

Subject Code
AUTO - Automotive Technology

Course Number:
1050

Title:
Numerical Applications in Automotive Service

Catalog Description:
Use of numerical concepts and principles in interpreting, assessing, and determining the need for automotive repair. Whole numbers, decimals, fractions, integers, graphs, ratios and percentages used to evaluate engine, electrical, chassis and HVAC system operation. Customary and metric conversions, reading automotive measuring devices and auto service repair order computations reviewed.

Credit Hour(s):
3

Lecture Hour(s):
3

Requisites

Prerequisite and Corequisite
None.

Outcomes

Course Outcome(s):
Apply numerical applications through a robust overview of vehicle components, basic engineering principles and systems to improve the proficiency of the automotive technician.

Essential Learning Outcome Mapping:
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Determine fluid capacities in servicing fuel, cooling and drivetrain systems.
2. Calculate a voltage drop, current flow or resistance value in an electrical circuit.
3. Analyze the gear ratios and torque output in a vehicle drivetrain.
4. Determine vehicle alignment settings based on tolerances provided in specifications.
5. Relate the pressure-temperature relationships of refrigerants used in a/c systems.
6. Convert a customary specification to a metric specification, and convert a metric specification to a customary specification using capacities, measurements, weights, pressure, and temperature values.
7. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Course Outcome(s):

Service information familiarization improves technician proficiency to prepare work orders, determine the need for automotive service, and evaluate the values obtained from measuring devices.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Assess component quality using values obtained from an automotive engine and the appropriate engine manual specifications.
2. Determine fluid capacities in servicing fuel, cooling and drivetrain systems.
3. Determine vehicle alignment settings based on tolerances provided in specifications.
4. Read a dial indicator, vernier caliper and micrometer.
5. Complete an automotive repair order using parts prices, service rates, and sales taxes.

Methods of Evaluation:

1. Quizzes
2. Exams
3. Written assignments
4. Case studies for vehicle repair orders

Course Content Outline:

1. Numeric analysis of automotive systems
   a. Internal combustion engine
      i. engine displacement
      ii. cylinder out-of-round
      iii. cylinder taper
      iv. valve stem to guide clearance
      v. engine rpm and horsepower
   b. Cooling and fuel
      i. fluid capacities
      ii. coolant and freeze protection
      iii. miles per gallon
      iv. volumetric efficiency
   c. Electrical
      i. circuit resistance, amperage, and voltage
      ii. voltage drop
      iii. wattage
      iv. electrolyte specific gravity
   d. Drive train
      i. torque
      ii. apply pressure
      iii. gear ratio
   e. Chassis
      i. hydraulic pressure
      ii. rotor lateral runout
      iii. rotor discard dimension
      iv. camber and caster adjustments
      v. tire size, diameter and wheel speed
   f. Heating and air conditioning
      i. British Thermal Unit (BTU) capacity
      ii. gauge reading conversion
      iii. refrigerant weights
2. Automotive repair orders
   a. Flat rate pay
   b. Part costs and estimating
   c. Sublet procedures

      d. Customer information
      e. Vehicle identifying information
      f. Customer concern
      g. Related service history
      h. Cause and correction
  3. Automotive measuring devices
      a. Standard and metric rulers
      b. Test meter scales
      c. Dial indicator
      d. Vernier caliper
      e. Micrometer

Resources

Halderman, James D. *Automotive Technology: Principles, Diagnosis, and Service.* 7th ed. New York, NY: Pearson, 2023.

Erjavec, Jack. *Automotive Technology: A Systems Approach.* 8th ed. Boston, MA: Cengage Learning, 2024.

Peterson, John C. and deKryger, William J. *Math for the Automotive Trade.* 6th ed. Boston, MA: Cengage Learning, 2018.

Duffy, James E. *Modern Automotive Technology*. 10th ed., Revised. Tinley Park, IL: Goodheart-Willcox, 2021.

Resources Other

1. http://www.campbellenterprises.com/Race%20math%20calculators.htm - Horsepower Calculator Compression Ratio Calculator, Race Math Formulas and Racing Math Resources
2. http://www.hotrod.com/articles/ccrp-0312-car-craft-math/ - Common Automotive Mathematic Equations
3. http://www.wikihow.com/Determine-Gear-Ratio (http://www.wikihow.com/Determine-Gear-Ratio/) - How To Determine Gear Ratios

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