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SET 179T.01: Marine Powerheads and Lower Units

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COURSE NUMBER AND TITLE: SET 179T MARINE POWERHEADS AND LOWER UNITS

DATE REVISED: Spring 2005

SEMESTER CREDIT: 6

CONTACT HOURS PER SEMESTER: 187 (7 ½ week class)
  Lecture hours per week: 10
  Lab hours per week: 15

PREREQUISITES: SET 178 MARINE ELECTRICAL and FUEL SYSTEMS

INSTRUCTOR: Jim Lizotte
E-MAIL: jim.lizotte@mso.umt.edu
PHONE: 406-243-7642
OFFICE LOCATION: T & T II, West Campus
OFFICE HOURS: Mondays, 8 am to 11 am

RELATIONSHIP TO PROGRAM: Recreational Power Equipment technicians must have the fundamental knowledge and skills necessary to service and repair personal watercraft and outboard motors. This course, along with the prerequisites, provides the foundation necessary for entry level technicians to be successful on the job.

COURSE DESCRIPTION: Theory, design, function, and components of outboard motor powerheads and lower units: basic rigging, power trim and tilt, propping, and personal watercraft design, function and maintenance.

STUDENT PERFORMANCE OUTCOMES:

  Occupational Performance Objectives

  Upon completion of this course, the student will be able to:

1. Remove, rebuild, and replace an outboard motor powerhead.
2. Remove, rebuild, and replace a personal watercraft engine.
3. Complete R & R of a personal watercraft drive system.
5. Pressure test hydraulic power trim & tilt systems and troubleshoot common hydraulic problems.
6. Replace outboard motor throttle and shift cables.
7. Disassemble, reassemble, and repair common styles of rewind starters.
8. Using the serial and model number, determine the model year of unit, and be able to locate the part numbers of components.
    Author: Stagner  Publisher: Prentice Hall
    Mercury/Mariner Student Training notebook (when available)
    NOTE: a digital multi-meter with a minimum of 10 amp D.C.
    capabilities is required.

STUDENT PERFORMANCE ASSESSMENT METHODS AND GRADING PROCEDURES:
The following criteria will be used for grading SET 179T MARINE POWERHEADS & LOWER UNITS
1. Written Tests 25%
2. Written Final Test 15%
3. Lab 45%
   a. Accuracy and quality of required worksheet completion
   b. Good use of lab time and following instructions
   c. Use of shop manuals and forethought
4. Complete, neat and organized notebook of all handout materials and notes; and a notebook of all completed job sheets. 5%
5. Demonstrating skills on a daily basis 5%
6. Lab organization, management, and neatness 5%

Safety glasses will be worn at ALL times when working in the lab; and in the classroom when working with storage batteries, chemicals, and soldering.

GRADING SCALE:
A= 93-100
B= 86-92
C= 75-85
D= 65-74
F= Below 65

NOTE: If you will not be able to attend class, you MUST call Lizotte at 243-7642. You are responsible for all make-up. Tests will be announced in advance. There will be no make-up tests except for very extenuating circumstances.

SAFETY: College of Technology safety rules will be followed at all times. Each student will receive a copy. A list is also posted on the classroom bulletin board. Failure to follow the rules can result in removal from class.

Suggestions for success in the RPE program:
1. Attitude is everything
2. Regular attendance is critical; tardiness is unacceptable
3. Take good notes
4. Pay attention
5. Study all assigned material on a regular basis and for tests
HOW VARIOUS ASSESSMENT METHODS WILL BE USED TO IMPROVE THE COURSE:
1. Student course evaluations
2. Peer feedback
3. Advisory committee feedback

COURSE OUTLINE
1. Marine two-stroke cycle operation
   A. Intake/compression stroke
   B. Power/exhaust stroke
   C. Designs and methods of porting
      a. Reed valve induction
      b. Piston port induction
      c. Cross flow design
      d. Loop scavenging
2. Powerhead
   A. Piston and rings
   B. Rods and bearings
   C. Seals
   D. Blocks
   E. Cylinder evaluation and measuring
   F. Cylinder honing
   G. Cooling systems
   H. Crankshafts
3. Mid –section and lower units
   A. Exhaust housing design
   B. Lower unit
      a. Operating principles
      b. Design
      c. Troubleshooting problems
      d. Shifting
      e. Lubricants
      f. Leakage testing
      g. Seal and bearing replacement
4. Trim & tilt systems
   A. Manual trim
   B. Power trim
5. Propeller Performance
   A. What a propeller does
   B. How it works
   C. Propeller terms
   D. Types
   E. Selection
6. Personal watercraft
   A. Design
   B. Engines
   C. Jet pumps
   D. Cooling systems
   E. Maintenance
   F. Storage
7. Outboard and personal watercraft ID
   A. Year and model identification
   B. Parts retrieval using microfiche
8. Rewind starters
   A. Designs
   B. Repair
      a. Rope replacement
      b. Spring replacement