STATE OF MICHIGAN
DEPARTMENT OF STATE
LANSING

CONTENTS OF THIS PACKET

This packet contains the following information regarding mechanic testing, certification, and trainee permit:

- Information for the Mechanic Trainee
- Locating Secretary of State Branch Offices & Test Tips
- Mechanic Certification Frequently Asked Questions
- Mechanic Study Guides

Read the information in this packet carefully. Then, if you have further questions about the materials, contact the Business Licensing Section at 1-888-SOS-MICH (1-888-767-6424).

INFORMATION FOR THE MECHANIC TRAINEE

There are two ways a person can obtain the skills needed to be a mechanic. The first is by going to a school which offers automotive training. This usually includes hands-on learning along with classroom studies. The other way is by working at a repair shop with an experienced mechanic who can teach proper repair methods and see that the work done by the trainee is correct.

Most good mechanics have learned their trade by both schooling and experience on the job. Today's cars and trucks are becoming more and more complicated to repair. This means that both training and experience are more important than ever to the person who wants to earn a living as a mechanic.

If you are currently performing major repairs on motor vehicles in Michigan, you must be a certified mechanic or hold a valid trainee permit.

A mechanic trainee permit is valid for a period of two years from the date of issue in the major repair categories listed on the permit. A permit may not be renewed. Upon expiration of the trainee permit, a mechanic trainee must either become certified or stop performing repairs in the categories listed on the permit.

A mechanic trainee may perform repairs only in the categories listed on the permit under the supervision of a mechanic who is currently certified by the State of Michigan in those repair categories.

A mechanic trainee should display his or her trainee permit in a conspicuous location, and when a mechanic trainee works on a motor vehicle, his or her name and trainee permit number must appear on the customer's final invoice. The name and certification number of the supervising mechanic must also appear on the final invoice. It is the responsibility of trainees and certified mechanics to ensure that their names and numbers are not used inappropriately by their employers.

The Office of Investigative Services may act to suspend or revoke a mechanic trainee permit if a trainee misrepresents the need for repairs, performs unnecessary repairs, or makes false or misleading statements in connection with a diagnosis or repair. In addition, a mechanic trainee may be required to obtain additional training or discontinue performing certain repairs if it is determined that the mechanic or trainee disregarded or departed from accepted industry repair standards.

12/04/18

MECHANIC FREQUENTY ASKED QUESTIONS

MECHANIC CERTIFICATION

1. Where can I obtain more information on becoming a certified mechanic in Michigan?

Answer:
Additional information is available under "Information for Mechanics" on the Department of State website.

2. Who must be a certified mechanic?

Answer:
You must be certified as a mechanic in Michigan if you repair motor vehicles for compensation, including the reconditioning, replacement, diagnosis, adjustment or alteration of the operating condition of the vehicle, or any component or sub-assembly in any category of major repair. If you perform major repairs and are not certified, you must get a mechanic trainee permit for those repair categories in which you work.

3. I have been told that I am exempt from having to become a certified or licensed mechanic in Michigan if I am currently certified by the National Institute for Automotive Service Excellence (ASE) in one or more categories. Is this true?

Answer:
No. ASE certification alone does NOT qualify you as a state certified mechanic in Michigan. However, you may be eligible to apply for state certification and transfer certain ASE categories to the application in lieu of taking state certification tests. Refer to the ASE Information page or contact the Business Licensing Section at 888-SOS-MICH (767-6424) for further information.

4. How do I become a certified mechanic?

Answer:
You must first pass a test for each repair category in which you want certification. Until you have passed the appropriate tests, you cannot apply for certification. A certification application will be included with the results letter if you successfully pass your test. Complete the application and return it with the $25.00 application fee to:

Michigan Department of State
Business Licensing Section
Lansing, Michigan 48918

5. What does it cost to become a certified mechanic?

Answer:
The fee to become a certified mechanic is $25. An amended certificate will be mailed to you at no cost if you pass additional tests after receiving your certification.

6. What are the motor vehicle repair categories which require state certification?

Answer:

The automobile and light truck repair categories for vehicles under 10,000 pounds GVW are:

1. Engine Repair
2. Engine Tune-up/Performance
3. Front End, Suspension & Steering Systems
4. Brakes & Braking Systems
5. Automatic Transmission
6. Manual Transmission, Front & Rear Drive Axles
7. Electrical Systems
8. Heating & Air Conditioning
9. Pre-1973 Vehicles

The heavy-duty truck repair categories for vehicles over 10,000 pounds GVW are:

1. Engine Repair - Gasoline
2. Engine Repair - Diesel
3. Drive Train
4. Brakes & Braking Systems
5. Suspension & Steering Systems
6. Electrical Systems

Repair categories for other on-road vehicles are:

1. Collision-Related Mechanical Repair
2. Unitized Body Structural Repair
3. Motorcycle
4. Recreational Trailer

7. What is the difference between a “Master Mechanic” and a “Specialty Mechanic”?

Answer:
An individual certified in all of the first eight categories of Automobile and Light Truck Repair is a Master Automobile Mechanic. Similarly, a mechanic certified in all six categories of Heavy-Duty Truck Repair is a Master Heavy-duty Truck Mechanic. Individuals with a certification in Motorcycle are also given a master status. A mechanic certified in seven or fewer of the first eight categories under the automobile and light truck heading, or five or fewer of the six categories under the heavy-duty truck repair heading or in the ‘other’ category is considered a Specialty Mechanic.

8. Does a technician who only does "bench work" (such as rebuilding automotive parts or components) have to be certified?

Answer:
Yes. When bench work (the rebuilding, reconditioning, machining, or assembling of parts or components from a motor vehicle) is performed by a technician at a registered repair facility, the technician must be certified as a mechanic in the proper repair category. This work involves a diagnostic process that is directly related to the shop's regulated activities. The only time a bench mechanic need not be certified is when the employer is not required to be a registered motor vehicle repair facility. For example, in a parts store that does not operate a motor vehicle repair facility (does not diagnose vehicles and does not remove or install parts), the technician turning brake rotors or rebuilding engines need not be certified.

9. How do I renew my mechanic certification license?

Answer:
There are two options for renewing your mechanic license: online or by mail.

To renew your mechanic certification online, you will need:

- Your preprinted mechanic renewal application
- The PIN printed in the upper-right corner of the application
- The last five digits of your Social Security number
- A valid Discover, MasterCard, Visa or electronic check

To renew by mail, return your completed renewal application form and check or money order to:

Michigan Department of State
Business Licensing Section
Lansing, Michigan 48918

Please note: You cannot renew online if more than 60 days has passed since your mechanic license expired (the license expiration date is found in Box 4 of your mechanic license renewal application).

MECHANIC TESTING & REGISTRATION

10. I have worked as a motor vehicle mechanic for many years. Do I have to take the mechanic tests?

Answer:
Yes, you must pass a test for each repair category in which you want to be certified. The law does not provide a "grandfather clause." The only way to qualify for state certification is to pass the state test or if you have passed tests administered by the National Institute for Automotive Service Excellence (ASE), you may be eligible to apply for state certification in certain automobile and heavy duty truck categories without further testing. ***ASE certification alone does NOT qualify you as a state certified mechanic***. Visit the ASE Information page or contact the Business Licensing Section at 888-SOS-MICH (767-6424) for further information.

11. Where can I take the mechanic tests?

Answer:
Motor vehicle mechanic tests are available at Secretary of State offices throughout the state. To obtain branch office location information (address or business hours), visit the Michigan Department of State Branch Office Locator. You will be required to pre-register prior to taking a test. There is a $6 fee for each test. Tests are offered on a first-come, first-serve basis. Tests are not available within one hour of closing.

12. Are the state tests offered in written or electronic format?

Answer:
State mechanic tests are offered electronically at a kiosk with a touch screen or on paper. Which format is available to you will depend on which Secretary of State office you are visiting. **PRE-REGISTRATION FOR ALL MECHANICS TESTS IS REQUIRED!**

13. Will I need to pre-register to take a mechanic test?

Answer:
Yes. You must pre-register before taking any mechanics tests in Michigan. There are no exceptions; whether you are a mechanic or a trainee, are currently licensed, have previously tested or have an expired certificate. Register for your test by creating an account if you are new, or accessing your existing account online through the Mechanic Test Registration System. The online system is available 24 hours a day, seven days a week.

14. What unique features have been included in the new testing format?

Answer:

- ✓ Immediate same day pass/fail results.
- ✓ Testing now available at all Secretary of State offices with registration.
- ✓ Secure 24/7 online registration in the privacy of your own home for faster service.
- ✓ Registration for tests (19 repair categories are available).
- ✓ Update your home address (for mechanic records only).
- ✓ Offices may offer kiosk touch-screen testing and/or written tests

15. What information is needed to register for mechanic tests?

Answer:

To register you will first need to create your account which includes: your name, address, birth date and Social Security number. You will also be required to create a user ID and password.

16. Will I need to bring anything with me to the testing location once I have registered?

Answer:

Yes. You will need to bring a printed copy of your mechanic payment receipt containing your test ID number and a driver's license or state identification card containing your photograph to the mechanic testing location. No other form of ID will be accepted.

17. Once I have registered for a test, is there a time limit for taking the test?

Answer:

Yes. You have 60 days from the receipt date to complete your test. After 60 days, the test will expire and refunds will not be provided. Re-registration will be required at an additional fee of $6 per test.

18. Will registering for a test require me to select a specific test location?

Answer:

No. You may test at any Secretary of State office in the state.

19. How will I be notified of my test results?

Answer:

You will be notified of your pass/fail status on the kiosk screen when you complete the test. If you are taking the written tests, you will be notified by the office staff once scoring is complete. For all testing formats, a detailed test result letter will be mailed within seven days of completing your test.

20. What is the minimum score needed to pass a test?

Answer:

Depending on the test taken, 65 percent or higher.

21. In what format are the test questions delivered and how many test questions are there?

Answer:

The mechanic tests contain multiple-choice questions and are intended to measure the minimum competencies necessary to work in a particular area of study. Your ability to pass a test depends on the amount of knowledge you have covering a specific area, and how you interpret the test items. No reference materials or electronic devices may be used during testing. Most tests have 55 questions. A few of the tests range between 65 and 100 questions.

22. Can a person who has a disability or difficulty with the English language take the mechanic tests?

Answer:

Yes. If you would have difficulty taking a written test because of special needs, you should contact the Business Licensing Section at 888-SOS-MICH (767-6424). You may be eligible for audio and interpreter assisted tests.

23. I took the state mechanic test and did not pass. Can I take the test again and will I have to pay the test fees again?

Answer:
Yes. You may retake any mechanic tests you did not pass. You must pay the $6.00 test registration fee for each test you retake. However, you are encouraged to study more or enroll in a training program before retaking a test.

24. Does the state provide study materials or textbooks for my use?

Answer:
Michigan does not provide or recommend any single textbook or published materials for your review when preparing for the mechanics tests. However, it is recommended that individuals who prefer home study acquire textbooks similar to those found in technical skill centers, and two- or four- year colleges. Typically, these types of textbooks are not found at your local library but are available through educational book stores and various online automotive publishers.

It is suggested that you prepare by reviewing the Mechanic Study Guides. These study guides provide a list of the categories and subcategories that will be on each test. Each category is given a percentage indicating how many of the test questions will be drawn from that category. This allows you to plan your study time and concentrate on those areas that are given the most emphasis on the test.

25. I took the state mechanic test but lost, or did not receive, my test results. How do I find out if I passed the test?

Answer:
If you have not received your test results or have lost them, contact the Customer Support Section at 888-SOS-MICH (767-6424). Secretary of State offices do not have specific information concerning your test results.

MECHANIC TRAINEE PERMIT

26. What is a mechanic trainee permit?

Answer:
The mechanic trainee permit makes it possible for the non-certified mechanic to work at a repair facility. A mechanic trainee employed by a repair facility must work under the direct supervision of a certified specialty or master mechanic.

27. How do I apply for a mechanic trainee permit?

Answer:
You must complete an Application for Motor Vehicle Mechanic Trainee Permit. The application is available at the Department of State website at: Mechanic Trainee Permit or by contacting the Customer Support Section at 888-SOS-MICH (767-6424). Return your completed application and $20.00 application fee to:

Michigan Department of State
Business Licensing Section
Lansing, Michigan 48918

No fee is required if you are a state-certified mechanic with an unexpired certificate.

28. What are the repair categories for a mechanic trainee?

Answer:
The mechanic trainee categories are the same as those for mechanic certification. You may obtain a trainee permit in any number of categories of repair but cannot remain a mechanic trainee in any single repair category for more than two years. Once expired, trainee permits may not be reissued.

MECHANIC RECERTIFICATION REQUIREMENTS

29. What is mechanic recertification?

Answer:
If you are an automotive and light truck mechanic certified in Engine Tune-up/Performance, Electrical Systems or Brakes and Braking Systems, you must comply with one of the following requirements for continuing certification. Certificates in the three categories noted are good for five years and must be renewed before their expiration date. All other repair categories are valid for life once issued.

- Pass the latest state mechanic certification test, or
- Show proof of current and appropriate National Institute for Automotive Service Excellence (ASE) certification, or
- Successfully complete a state-approved training program.

Mechanics certified in these categories must comply with the recertification requirement before their certification expiration date, according to the schedule below:

Mechanic Category	Recertification Year	Ongoing Recertification Renewal
Engine Tune-up/ Performance	2018	2018, 2023, 2028
Electrical Systems	2019	2019, 2024, 2029
Brakes & Braking Systems	2020	2020, 2025, 2030

For example, John Brown's mechanic certificate expires each year on July 16. John last recertified his Engine Tune-up/Performance certificate on July 16, 2018, making his next recertification date July 16, 2023. He last recertified in Electrical Systems July 16, 2019, so he'll have to recertify again in July 16, 2024. He'll have until July 16, 2020 to recertify in Brakes & Braking Systems after meeting the requirements on July 16,2025.

If you have additional questions about the Michigan mechanic certification program or requirements, contact:

Michigan Department of State
Business Licensing Section
Lansing, MI 48918-1210
Telephone: 1-888-SOS-MICH (1-888-767-6424)
Fax: (517) 335-2810

MECHANIC STUDY GUIDES

Table of Contents

Mechanic Study Guide
Engine Repair
Automobile & Light Truck Repair

Engine Block Diagnosis & Repair - 12%
Using a bore gauge
Honing a newly bored cylinder Engine bore diagnosis
Installing pistons in block
Cleaning and assembling

Cylinder Head/Valve Train Diagnosis & Repair - 21%
Intake valve deposits
Valve tappet clearance
Valve timing understanding
Valve tappet adjustment
Valve guide wear
Valve refacing
Valve spring diagnosis
Noisy lifter diagnosis
Valve seats

General Engine Diagnosis - 19%
Oil consumption
.001” cylinder leakage test Compression test
Sludge in crankcase
Vacuum testing
Low oil pressure
Crankcase blow-by diagnosis
Spark plug diagnosis

Piston Diagnosis & Repair - 10%
Piston design
Ring groove diagnosis Piston ring diagnosis

Crankshaft &Camshaft Diagnosis & Repair - 15%
Crankshaft end-play Journal taper diagnosis
Installing cam bearings Camshaft diagnosis
Crankshaft diagnosis

Miscellaneous - 23%
Understanding measurements to Engine
Assembling procedures
Diagnosing coolant bubbling
Micrometer reading
Bolt head markings
Engine break-in
Water pump diagnosis
Turbocharger diagnosis
Engine R&R procedures
Basic carburetor diagnosis
Vibration/misfire diagnosis
Plastigage use

SAMPLE QUESTION:
A transverse mounted engine with front wheel drive must be removed from the car. All of the following are generally recommended EXCEPT:

A. Removing the engine and transaxle as a unit.
B. Disconnecting the speedometer cable.
C. Disconnecting the half-shafts.
D. Removing the differential gears.

ANSWER: D

Mechanic Study Guide
Automatic Transmission
Automobile & Light Truck Repair

Component Diagnosis - 8%
Hydraulic pump
Torque converter
Clutch pack clearance
Pump gear clearance

Internal Operation - 32%
Gear train end-play
Clutch band servo
Planetary gear set
Multiple disc clutch packs
Passing gear operation
Lock-up converters
Vacuum modulator
Valve body shift valves
Shift points
Governor operation
TPS (throttle position sensor)
Operation

General Diagnosis - 18%
Harsh engagement
Governor malfunctions
Fluid diagnosis
Glazed band diagnosis
Fluid leak diagnosis
Pressure testing
Spool valve diagnosis
Burned clutch diagnosis
Fluid loss diagnosis

Drivability Diagnosis - 28%
Downshift problems Improper shifting Upshifting problems Modulator problems
Shift linkage adjustment No drive diagnosis
Creeps in neutral Restricted filter
Noisy transmission
Slipping Transmission
Sluggish operation

Repair Procedures 6%
Transmission remove & replace
Stator support bushing wear
Cooler line repair
Pump to converter engagement

Miscellaneous - 8%
Valve identification Fluid types
Transaxle knowledge
Valve body components
Direct drive condition

SAMPLE QUESTION:
It takes a moment for the car to move after the gear selector has been placed in “drive.” Which of the following would cause this problem?

A. A defective neutral safety switch.
B. A partially plugged screen.
C. An inoperative lock-up converter clutch.
D. None of the above.

ANSWER: B

Component R & R - 10%
Cluster gear remove & replace
Extension housing seal remove & replace
Synchronizer replacement

Transmission/Transaxle Diagnosis - 30%
Fluid diagnosis
Hard shifting complaints
Transmission vs. transaxle comparison
Cluster gear end-play
Transaxle gear recognition from picture
Synchronizer problems & operation
3, 4 & 5 speed diagnosis from picture (4 questions)
Overdrive operation
Extension housing bushing wear
Noise diagnosis
Defective output shaft

Final Drive - 30%
Ring gear run-out
Noise diagnosis
Differential diagnosis
Differential pinion nose angle
Ring & pinion gear sets
Ring & pinion backlash
Pinion bearing preload
Final drive ratio
Pinion seal remove & replace
Limited slip diagnosis
Differential bearing preload
Lubricant Types

Axle Shaft\C.V. Repair - 10%
CV boot installation
Drive axle noise diagnosis (2 questions)
CV joint operation
Vibration Diagnosis

Clutch Diagnosis & Repair – 10%
Clutch disc operation
Noise diagnosis
Chatter diagnosis
Shifting problem diagnosis

Miscellaneous - 10%
Bearing removal and installation procedures
Drive train noise diagnosis
Gear recognition
Trans interlock function
Understanding how direct drive & gear reduction is accomplished

SAMPLE QUESTION:
The main reason for making a rear end gear tooth contact pattern is to check:

A. Carrier end-play.
B. Carrier bearing preload.
C. Axle gear clearance.
D. Pinion depth.

ANSWER: D

Mechanic Study Guide
Front End, Suspension & Steering Systems
Automobile & Light Truck Repair

Alignment Diagnosis - 34%
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Camber understanding
Camber adjusting procedures for various suspension systems
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Caster understanding
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Tire Wear Diagnosis - 10%
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Feathered outside edge wear
Wear on both inside & outside of tire

Suspension Diagnosis - 18%
Ball joint diagnosis
Measuring curb height
Torsion bar remove & replace
Ball joint remove & replace procedure
MacPherson suspensions
Automatic leveling systems

Steering Diagnosis - 18%
Rack & pinion diagnosis
Power assist diagnosis
Tie rod end diagnosis
Steering gear adjustment
Steering linkage diagnosis
Power steering system bleeding

Drivability Diagnosis - 16%
Pulling diagnosis
Road crown compensation
Wandering or darting diagnosis
Shimmy & bounce diagnosis
Steering wheel centering

Miscellaneous - 4%
Brake rotor R & R precautions
Wheel bearing adjustment

SAMPLE QUESTION:
A car has excessive lean on turns (body roll). This could be caused by:

A. Bad shocks.
B. Worn sway bar bushings.
C. Weak springs.
D. All the above.

ANSWER: D

Mechanic Study Guide
Brakes & Braking Systems
Automobile & Light Truck Repair

System Diagnosis - 20%
Load sensing proportioning valves
Brake pedal pulsation
Grabbing brakes
Brake lock-up
Dragging brakes
Combination valve
Gear lube in drums
Brake booster

Master Cylinder Diagnosis & Repair - 9%
Low fluid level
Rebuilding
Swollen diaphragm
Sinking pedal

ABS Diagnosis & Repair - 20%
Pump/motor operation
Safety precautions
Speed sensors
Wheel speed readings
3-way circuits
4-way circuits
Hose replacement

Drum Brake Diagnosis & Repair - 22%
Drum turning, finish
Single anchor
Bendix type
Self-adjuster diagnosis
Noise diagnosis
Measuring
Primary and secondary shoes

Disc Brake Diagnosis & Repair - 16%
Rotor thickness variation
Rotor surface finish
Caliper overhaul
Brake noise
Brake adjustment
Measuring, lateral run-out

Repair Procedures - 13%
Brake line bleeding
Brake fluid diagnosis
Replacing wheel bearings/races
Brake adjustments

SAMPLE QUESTION:
A car has a spongy pedal. Which of the following could be the cause?

A. Air in the system.
B. An internal master cylinder leak.
C. Worn brake pads.
D. Warped brake disc.

ANSWER: A

Mechanic Study Guide
Electrical Systems
Automobile & Light Truck Repair

OHMS Law & Electrical Symbol Recognition - 14%
Ohmmeter symbol
Splice symbol
Resistor symbol
Switch symbol
Solenoid symbol
Circuit breaker symbol
Variable resistor symbol
Lamp symbol
Diode symbol LED symbol

Test Methods/Meter & Equipment Usage - 11%
Ohmmeter usage
Voltmeter usage
Ammeter usage

Starting System Diagnosis - 20%
Capacity/load testing
Starter armature testing
Starter current draw
Starter relay diagnosis
Voltage drop tests
Circuit resistance test
Battery test
Starter drive diagnosis

Charging System Diagnosis - 5%
R & R battery properly
Alternator output testing

Miscellaneous Circuit Diagnosis - 32%
Short to ground
Regulator diagnosis
Blower motor circuit diagnosis
Horn circuit diagnosis
Turn signal circuit
Dimmer switch diagnosis
Tail lamp circuit
Dash light circuit
Windshield washer pump circuit
Cooling fan circuit
Oil pressure light circuit

General - 18%
Measuring current flow
Voltage drops
Parallel circuit diagnosis
Junction block replacement
E.S.D. (Electrostatic Discharge)
S.I.R. (Supplemental Inflatable Restraint)
Precautions

SAMPLE QUESTION:
The maximum allowable voltage drop across the ground circuit of the starter system is:

A. .2 volt.
B. .7 volt.
C. 1/2 volt.
D. 1 volt.

ANSWER: A

Heating & Engine Cooling System Diagnosis - 22%
Leak diagnosis
Low coolant in radiator
Thermostat Coolant mixture
Low heater output
Windshield fogging
Heater core hose routing
Radiator cap
Defrost operation
Overheating

General Knowledge of A/C Components & Their Functions - 16%
Receiver drier
Ambient temperature switch
Orifice expansion tube
Compressor muffler
Condenser
Evaporator
Fixed orifice tube
Halide tester

General Knowledge of A/C Systems - 18%
R-12 vs. R134-a
Refrigerant (understanding change between liquid & gas)
Operating pressures
Effect of moisture in the system
Effect of outside temperature & humidity on System

A/C Diagnosis - 24%
H2O at air ducts
Finding leaks
Overcharged system
Compressor clutch
Gauge set readings
Lack of cold air
Schematic diagnosis

A/C Repair Procedures - 16%
Precautions when discharging system
Compressor O-ring replacement
Correction of excessively high pressure
Compressor replacement
Hose replacement
Charging the system
Leak detection
Condenser replacement

Refrigerant Recovery, Recycling & Handling - 4%
CFC's (Chlorofluorocarbons) and their effect on the environment
Recycle or replace R-12 and R-134a

SAMPLE QUESTION:
An A/C control system has an apparent vacuum leak. Which of the following is the best way to locate the leak?

A. Feel around the suspected line or component.
B. Trace the origin of the hissing sound.
C. Install known good hoses and components in place of the original components.
D. Spray water on the suspected areas.

ANSWER: B

Mechanic Study Guide
Engine Tune-up/Performance
Automobile & Light Truck Repair

Computer Control & Sensor Basics - 24%
ROM (Read Only Memory)
Fault codes
Maintaining stoichiometric balance
Closed loop
Oxygen sensor diagnosis
Knock sensor function
Self-diagnosis
Hall sensor pattern reading
Types of meters to use
Scan tool usage
TPS operation

Ignition Systems - 13%
Scope pattern diagnosis
Setting timing
No spark diagnosis
Spark plug voltage requirements

Carburetor & Fuel Injection - 10%
Injector pulse width
Fuel line replacement
E.F.I. principals
“Heavy float” symptoms
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Performance Basics - 10%
Causes of detonation
Spark plug diagnosis
Dirty air cleaner symptoms
Causes of a lean mixture
Influences on performance

Diagnosis (starting system & misc.) - 18%
Engine timing
Slow cranking diagnosis
Circuit resistance checks
Engine vacuum
Catalytic converter
Cylinder leakage
Compression test

Emission Control Systems - 25%
EGR operation
Evaporative emission control system
Hydrocarbon levels
Oxides of nitrogen
O2 sensor operation
Fuel vapor recovery system
Carbon monoxide levels
Exhaust analyzer readings
Engine timing & effect on emissions
Catalytic converter’s purpose

SAMPLE QUESTION:
In automotive computers, this memory contains information that tailors the computer to the vehicle.

A. Programmable Read Only Memory (PROM).
B. Controllable Access Memory (CAM).
C. Random Access Memory (RAM).
D. None of the above.

ANSWER: A

Steels (Characteristics & Identification) - 12%
UHSS (Ultra High Strength Steel)
HSS (High Strength Steel)
Tensile strength
Identification of various steels

Pulling (Straightening) - 8%
Overpulling
How to minimize tearing
Anchoring

Welding - 20%
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Oxyacetylene
Brazing
Shielding gas
Weld quality
Electrode wire use
Precautions
Types of welds
Types of welders

Repairing Structural Components - 25%
A-pillars & B-pillars
Location of welds
Sectioning
Joints to use
Corrosion protection
Weld-through primers
Glass installation

Measuring/Damage Analysis - 21%
Point to point
Indirect damage
Direct damage
Secondary damage
Primary damage
Datum plane
Asymmetrical dimensions
Vehicle centerline
Centering gauges
Loaded measurement

Unitized Body General Understanding - 14%
Crush zones
Design features which initiate the crush process
Space frame construction
Manufactures' tolerances
One-time fasteners

SAMPLE QUESTION:
Two-part epoxy primers:

A. Provide corrosion protection close to OEM E-coat.
B. Have an indefinite pot life.
C. Should be used on structural parts only if a lacquer primer surfacer is not available.
D. All of the above.

ANSWER: A

Steering Components - 12%
Adjustments
Rack & Pinion
Power Steering

Heating & Cooling - 10%
General Questions

Electrical - 30%
Turn Signals
Horn Circuit
Lights
Starter system

Drive Train - 28%
Bearings
Noise Diagnosis
Transaxle
Transmission Linkage

Brakes - 10%
Brake Lines
Hydraulics
Measuring Techniques

Miscellaneous - 10%
Steering Columns
Fuel Leaks

SAMPLE QUESTION:
The mechanic notices antifreeze under the car after completing collision repairs. What should he or she do next?

A. Remove the radiator and pressure test.
B. Warm up the engine thoroughly then recheck.
C. Visually inspect the vehicle for signs of a leak.
D. Nothing, it is normal for the cooling system to leak after a collision.

ANSWER: C

Mechanic Study Guide
Motorcycle Repair
Automobile & Light Truck Repair

Fuel Systems - 10%
Causes of a lean mixture
Carburetor systems; float, power, choke, etc.
Spark plug diagnosis
Causes of a rich mixture
Idle mixture adjustment
Diagnosis of a worn needle and seat
Crankcase flooding diagnosis
Carburetor jets
Understanding the idle circuit on a slide type Carburetor

Skill in Measuring - 13%
Measuring piston ring grooves
Crankshaft end-play
Using plastigage
Using a dial indicator
Spark plug gap
Shaft run-out
Cylinder bore measurements
Understanding decimal equivalents up to 1/1000”
Piston ring end-gap
Reading a micrometer
Understanding metric system measurements

Repair Skills - 17%
Cylinder head bolt torque procedure
Compression test
Repairing float valve wear
Replacing a steel bearing race in aluminum case
Replacing the master link in a drive chain
Valve adjustment
Finishing cylinder walls at overhaul
Fitting pistons to the cylinder
Cylinder leak down test
Valve guide wear
Oil pump installation
Breaker point alignment
Checking for bent forks

Ignition & Electrical - 20%
C.D.I. systems compared to point systems
Flywheel stampings
Splicing electrical connections
Continuity testing
Checking voltage in a system
Diagnosing turn signal circuits
Master cylinder operation
Point burning
What tool is necessary to time a flywheel
Timing advance
Alternator output problems
Diagnosing a condenser
Battery charging rates
Zener diode operation

Diagnosis - 17%
Poor running with black smoke under heavy throttle
Transmission shifting problems
Backfire
Spark plug fouling and diagnosis
Undershifting or jumping out of gear problem
Coil diagnosis
Hard starting or no start problems
Low oil pressure
Restricted air intake
Rough running and backfiring problems

General - 23%
Sticking hydraulic forks
Deglazing cylinders
Understanding the 4-stroke cycle engine
Clutch operation and diagnosis
Full floating piston pins
Oil pressure relief valve operation
Alternator or generator operation
Brake system operation
Adjusting steering stem bearings
Piston slap
Camshaft operation
What is a hydrometer used for
Front drum bakes
Spark plug “reach”
Oil consumption

SAMPLE QUESTION:
Oil circulation in the engine:

A. Goes from sump to oil pump to bearings to filter.
B. Goes from filter to bearings to oil pump.
C. Goes from bearings to filter to oil pump to sump.
D. Goes from sump to oil pump to filter to bearings.

ANSWER: D

Mechanic Study Guide
Recreational Trailer
Automobile & Light Truck Repair

Electrical Diagnosis - 36%
Trailer tail lamps
Ground wire problems
Turn signal circuits
Determine voltage drop
Trailer stop lamps
Brake controllers
4-Wire connectors
Current supply for trailer brakes
Electrical symbols
Flasher diagnosis
Color codes
Causes of blown fuses
Current flow/resistance

Brake Diagnosis - 26%
Loss of brakes
Grabby brakes
Dragging brakes
Erratic braking, surging
Pull to one side during braking
Adjusting trailer brakes
Brake shoe recognition

Springs/Hitches - 16%
Leaf springs
Equalizing hitches
Adjustment of hitches
Types of trailer springs
Spring maintenance

General Knowledge - 12%
Surge brakes
Reducing sway
Wheel bearing adjustment
Hydraulic brake lines
Metric measurements
Tire wear diagnosis

Wheels/Hubs - 10%
Wheel bearing diagnosis
Wheel bolt torque pattern

SAMPLE QUESTION:
Current flow resistance is decreased when:

A. Wire length is increased.
B. Wire diameter is decreased.
C. Corroded terminals are replaced.
D. All of the above.

ANSWER: C

Ohms Law & Electrical Symbol Recognition - 13%
Ohms Law
Splice symbol
Diode symbol
Relay symbol

Starting System Diagnosis – 13%
Starter current draw
Starter relay diagnosis
Circuit resistance Test
Battery test

Miscellaneous Circuit Diagnosis – 6%
Regulator diagnosis
Horn circuit diagnosis

General – 13%
Electrostatic discharge
Voltage drop test
Circuit protection

Test Meter Usage – 6%
Ohmmeter usage
Voltmeter usage

Installation/Legal questions

Legal Requirements – 25%
Installer requirements
Service area requirements
Customer requirements
Customer training

General – 24%
Violation reset
Tampering
Emergency bypass code
Removal of device
Set point

Mechanic Study Guide
Engine Repair - Gasoline
Heavy Duty Truck Repair

Engine Mechanical Components - 16%
Cylinder blocks
Pistons
Fuel pumps
Spark plugs
Governors
Cylinder heads

Diagnosis - 30%
Engine Miss
Compression test diagnosis
Rough idle
Engine knocks
Power loss
Blue smoke
Overheating

Basic Procedures - 22%
Grinding valves
Starting a flooded engine
How to measure cam lobe wear
Measuring plug wire resistance
Engine assembly
Understanding bolt markings
Valve Adjustment

Skills In Measuring - 14%
How to check cylinder head flatness
How to check crankshaft end-play
Reading a micrometer
Reading plastigage
Measuring main and rod journals

System Operation - 18%
Understanding how engines operate
Purpose for checking clearances
Understanding carburetor operation
Cooling system operation
Engine timing
Ignition systems

SAMPLE QUESTION:
What are the minimum and maximum measurements of a shaft given as 3.750 plus or minus .010?

A. 3.650 - 3.850
B. 3.749 - 3.751
C. 3.740 - 3.780
D. 3.740 - 3.760

ANSWER: D

Mechanic Study Guide
Engine Repair – Diesel
Heavy Duty Truck Repair

Engine Components - 24%
Detroit blower rotor clearance adjustment
Piston rings
Piston ring grooves
After cooling – benefits
Bolt grade recognition
Lube oil coolers
Turbo charger operation
Valve bridge function

Diagnosis - 34%
Turbo problem diagnosis
Coolant in crankcase
Smoke problem diagnosis
Engine operating temperature
Low oil pressure
Engine tear-down diagnosis
Blow-by
Crankshaft diagnosis
Engine Miss

Lube & Fuel - 10%
Direct injection
Leaky fuel lines
Restarting and engine that has run out of fuel
Fuel Filters

Skills In Measuring - 12%
Tools for measuring
Plastigage reading
Cylinder taper
Reading a micrometer
Crankshaft End-play

Miscellaneous - 20%
Using a vacuum gauge
Fuel shut-off solenoid
Idle speed
Detroit diesel R.P.M. setting
Understanding 2-stroke, 4-stroke engines
Valve seat width
Valve lash adjustment
Overheating

SAMPLE QUESTION:
A diesel engine misses at all speeds and there is a puff of smoke when it misfires. What is the most likely cause of this problem?

A. Erratic governor action.
B. Stale fuel.
C. A miscalibrated pump.
D. A sticking nozzle.

ANSWER: D

Mechanic Study Guide
Drive Train
Heavy Duty Truck Repair

Clutch Diagnosis - 10%
Causes of hard shifting
Free play
Hydraulic clutch fluid
Reason for clutch slipping

Clutch Components - 12%
Clutch brake
Pilot bearing
Linkage adjustment

Axle & Driveline Diagnosis - 22%
Adjusting driveline angles
Pinion bearing preload
Axle shaft replacement
U-Joint angles
Air shift controls
Two-Speed planetary axle

Axle & Drive line Components - 22%
Ring and pinion backlash
Inter-axle differential lock
Drive shaft removal
Pinion bearing preload adjustment
U-joint replacement
Differential side bearing preload

Transmission Diagnosis - 22%
Causes of hard shifting
Gear slipout
Slow shifting problem in a twin countershaft
Transmission

Transmission Components - 12%
Synchronizers Seal installation
10-Speed twin countershaft operation
4 & 5-Speed synchronized transmissions
Transmission Interlock

SAMPLE QUESTION:
Which of the following could cause driveline vibration?

A. Bad engine mounts.
B. Crossed plug wires.
C. Over lubed universal joints.
D. All of the above.

ANSWER: A

Mechanic Study Guide
Brakes & Braking Systems
Heavy Duty Truck Repair

Basic Knowledge - 20%
Inversion valve function
Anti-skid brakes
Hydraulic brake line material
Air brake hand valve
Brake chatter
Vacuum booster operation
Air brake line routing
Engine (Jacobs) brake
Air over hydraulic systems

Repair Skills, Air Brakes - 8%
Finding air leaks
Adjusting cam actuated brakes
Brake linkage lubrication
Air line material

Repair Skills, Hydraulic Brakes - 10%
Wheel cylinder assembly
Power booster
Master cylinder residual valve
Master cylinder operation

Diagnosis, Air Brakes - 34%
“S” cam brakes
Air pressures for fail-safe brakes
Cause of excessive air pressure
Dual diaphragm brake chamber operation
Compressor operation
Tractor protection valves
Air brake systems operation
Inoperative trailer brakes
Straight truck air line and operation
Trailer brakes won’t release

Diagnosis, Hydraulic Brakes - 14%
Causes of a pulsating pedal
Brake booster operation
Swollen master cylinder diaphragm
Cause of gear lube inside brake drums
Brake lining wear diagnosis
Grabbing brakes

Basic Repair Procedures - 14%
Spring brake repairs
Pushrod travel
Air reservoirs
Slack adjuster and pushrod angle
Grease-soaked brake linings

SAMPLE QUESTION:
Which of the following should a mechanic do before taking apart a spring-type parking brake?

A. Fill the air reservoir.
B. Remove the quick release valve.
C. Remove the diaphragm clamp.
D. Cage the spring.

ANSWER: D

Mechanic Study Guide
Suspension & Steering Systems
Heavy Duty Truck Repair

Steering System Diagnosis - 18%
Hard steering complaint
Recovering from a turn
Noise in the power steering unit
Wheel shimmy
Tie rod end wear
Oil foaming in power steering system

Suspension Diagnosis - 14%
Air ride suspension operation
Leaf spring failure
Tire problems
Hendrickson suspensions
Torque rods
Tandem axle alignment

Wheel Alignment - 12%
Causes of uneven and rapid tire wear
Front end alignment procedure
Toe-in adjustment
Tire wear diagnosis

Caster/Camber - 6%
How to adjust caster on a solid axle
Recognize extreme conditions from a picture

Basic Steering System Knowledge - 32%
Front suspension components
Steering gears
Wheel bearings
Steering Wheel freeplay
Steering kunckle wear
Installing kingpin bushings
Sector shaft adjustment
Power steering pump replacement

Basic Suspension Knowledge - 18%
Cap screw head markings
Suspension adjustment
Equalizing beam suspensions
Adjustable trailer axles

SAMPLE QUESTION:
A tractor trailer rig with tandems on both units rides and handles good when loaded. When unloaded, the rig wonders. Which of the following is the most likely cause of this condition?

A. Misaligned trailer tandems.
B. Wrong caster settings.
C. Misaligned tractor tandems.
D. Wrong toe setting.

ANSWER: B

Mechanic Study Guide
Electrical Systems
Heavy Duty Truck Repair

System Diagnosis - 22%
Lamp circuits
High & low beam headlamp questions
Dash lights
Alternator circuits
Windshield wiper circuit
Oil pressure sending unit
Circuit diagnosis
Horn Circuits

General - 10%
Batteries
Fusible links
Hydrometer use
Jump starting
Fuse box replacement

Vehicle Lighting - 18%
Turn signal circuit
Tail lamp circuit
Head lamp circuit
Dash light circuit
Clearance lights

Starting Systems - 24%
Battery hook-ups
Starter circuit resistance
Specific gravity readings
Solenoid problems
Starter draw test
Starter drives
Starter no-load test

Charging Systems - 12%
Low or unsteady alternator output
Alternator
Circuitry
Overcharged battery problem
Alternator amperage limit

Test Methods & Equipment - 14%
Voltmeter use
Ohmmeter use
Circuit testing
Verifying a circuit drain
Alternator rotor tests
Ammeter use

SAMPLE QUESTION:
The alternator output current is 0 amps. What could cause this condition?

A. An open diode.
B. A grounded rectifier bridge.
C. An open rotor winding.
D. All of the above.

ANSWER: C