Texas CTE

Automotive Technology I: Maintenance and Light Repair (Two Credits)(2015)

Knowledge and skills. D

1 **The student demonstrates academic skills related to the requirements of automotive technology. The student is expected to:** D.1

A demonstrate effective oral communication skills with individuals from various cultures such as fellow students, coworkers, and customers; D.1.A

B demonstrate effective written communication skills, including documenting on a repair order the customer concern/complaint, root cause of the failure, and corrective action to complete the repair; and D.1.B

C demonstrate mathematical skills in performing addition, subtraction, multiplication, division, and measurements using decimals and fractions in the metric and U.S. standard systems as appropriate. D.1.C

2 **The student demonstrates technical knowledge and skills related to the manufacturer preventative maintenance schedule. The student is expected to:** D.2

- A locate the manufacturer recommended preventative maintenance schedule; D.2.A
- B perform a preventative maintenance inspection of vehicle systems, including engine, fuel, lubrication, cooling, electrical, suspension, drive train, and airconditioning systems; D.2.B
- C describe the function of the automotive chassis components, including braking, steering, transmission, drive train, and suspension systems; D.2.C
- D locate, read, and interpret service repair information such as schematics, charts, diagrams, graphs, parts catalogs, and technical bulletins; D.2.D
- E use published specifications to diagnose component wear and determine necessary repairs; D.2.E
- F identify the appropriate oil viscosity and capacity; D.2.F
- G verify operation of the instrument panel engine warning indicators; D.2.G
- H inspect engine assembly and document findings of fuel, oil, coolant, and other leaks; D.2.H
- I perform common fastener and thread repair, including removing broken bolt, restoring internal and external threads, and repairing internal threads with thread insert; D.2.I
- J inspect, replace, and adjust drive belts, tensioners, and pulleys; D.2.J
- K perform engine oil and filter change; and D.2.K
- L explain and perform a "jump-start" of a vehicle using jumper cables and a booster battery or an auxiliary power supply according to manufacturer recommended procedures. D.2.L

3 **The student demonstrates the functions and applications of the tools, equipment, technologies, and materials used in automotive technology. The student is expected to:** D.3

- A demonstrate the proper use of hand and power tools and equipment commonly employed in the maintenance and repair of vehicles; and D.3.A
- B discuss the proper handling and disposal of environmentally hazardous materials used in servicing vehicles. D.3.B

4 **The student applies the technical knowledge and skills related to brakes in simulated or actual work situations. The student is expected to:** D.4

A explains Pascal's Theory of Hydraulics as it relates to the brake system; D.4.A

B inspect brake system components, including master cylinder, brake lines, wheel cylinders, calipers, and flexible hoses and fittings, for external leaks and proper operation; D.4.B

C inspect, measure, and refinish brake drum diameter to manufacturer specifications; D.4.C

D remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; D.4.D

E lubricate, reassemble, and pre-adjust brake shoes and parking brake; D.4.E

F remove, inspect for damage or wear, clean, lubricate, and reassemble pads and retaining hardware, caliper assembly, and mounting components such as slides and pins for proper operation; D.4.F

G refinish a rotor on and off a vehicle and measure final rotor thickness with manufacturer specifications; D.4.G

H retract and re-adjust caliper piston on an integral parking brake system; D.4.H

I check brake pedal travel with, and without, engine running to verify proper power booster operation; D.4.I

J check brake pedal travel with, and without, engine running to verify proper power booster operation; D.4.J

K check vacuum supply from a manifold or auxiliary pump to vacuum-type brake power booster; and D.4.K

L describe the operation of a regenerative braking system. D.4.L

5 **The student applies the technical knowledge and skills related to electrical systems in simulated or actual work situations. The student is expected to:** D.5

- A demonstrate knowledge of electrical/electronic series, parallel, and seriesparallel circuits using principles of electricity as defined by Ohm's Law; D.5.A
- B demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop, current flow, resistance, and ground circuits; D.5.B
- C use wiring diagrams to trace electrical/electronic circuits; D.5.C
- D demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits; D.5.D
- E confirm proper battery capacity for vehicle application and perform battery capacity test; D.5.E
- F perform battery state-of-charge test; D.5.F
- G inspect and clean the battery, fill battery cells, and check battery cables, connectors, clamps, and hold-downs; D.5.G
- H perform starter current draw test; D.5.H
- I inspect and test fusible links, circuit breakers, fuses, and relays; D.5.I
- J perform charging system output test; D.5.J
- K inspect, adjust, or replace generator/alternator drive belts and check pulleys and tensioners for wear and belt alignment; D.5.K
- L verify operation of instrument panel gauges and warning/indicator lights, and reset maintenance indicators; D.5.L
- M inspect interior and exterior lamps and sockets, including headlights and auxiliary light such as fog and driving lights and replace as needed; and D.5.M
- N verify windshield wiper and washer operation and replace wiper blades as needed. D.5.N

6 **The student applies the technical knowledge and skills related to heating and air conditioning (A/C) in simulated or actual work situations. The student is expected to:** D.6

- A identify refrigerant type and the safety and environmental concerns related to handling and storage; D.6.A
- B inspect engine cooling and heater systems hoses; D.6.B
- C inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; D.6.C
- D inspect A/C condenser for airflow restrictions; and D.6.D
- E identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. D.6.E

7 The student applies the technical knowledge and skills related to manual and automatic drive train and axles in simulated or actual work situations. The student is expected to: D.7

- A identify the different fluid types used in both an automatic and manual transmission/transaxle; D.7.A
- B identify the fluid types and capacity required by application using service information; D.7.B
- C check fluid level in a transmission or a transaxle equipped with a dip-stick; D.7.C
- D check fluid level in a transmission or a transaxle not equipped with a dipstick; D.7.D
- E check fluid condition and inspect for leaks; D.7.E
- F drain and replace fluid and filter or filters in an automatic transmission/transaxle; D.7.F
- G drain and replace fluid in an manual transmission/transaxle; and D.7.G
- H inspect power train mounts. D.7.H

8 The student applies the technical knowledge and skills related to engine performance in simulated or actual work situations. The student is expected to: D.8

- A inspect and explain the electrical/electronic components, sensors and circuits on an on board diagnostics (OBD) controlled engine; D.8.A
- B perform engine absolute manifold pressure tests such as vacuum or boost; D.8.B
- C verify engine operating temperature; D.8.C
- D remove and replace spark plugs and inspect secondary ignition components for wear and damage; D.8.D
- E describe the importance of operating all OBD II monitors for repair verification; D.8.E
- F retrieve and record diagnostic trouble codes, OBD II monitor status, and freeze frame data and clear codes when applicable; D.8.F
- G inspect, service, or replace air filters, filter housings, and intake duct work; D.8.G
- H replace fuel filter or filters; D.8.H
- I inspect integrity of the exhaust manifolds, exhaust pipes, mufflers, catalytic converters, resonators, tail pipes, and heat shields; and D.8.I
- J inspect, test, and service positive crankcase ventilation (PCV) system and its components such as the filter/breather cap, valve, tubes, orifices, and hoses. D.8.J

9 **The student applies the technical knowledge and skills related to suspension systems and simulated or actual work situations. The student is expected to:** D.9

A identify and interpret tire sidewall data information such as Department of Transportation (DOT) production date information, tire load capacity, inflation pressures, sizing description, and speed rating; D.9.A

B demonstrate tire tread depth measuring procedures using industry standards such as common tread depth gauges; D.9.B

C demonstrate tire and wheel balance such as static and dynamic balance, and proper wheel weight selection; D.9.C

D demonstrate tire and wheel measurements such as radial and lateral run-out in tire and wheel assembly; D.9.D

E inspect steering linkage components and mounts such as inner and outer tie-rod ends, pitman arm, idler arm, inner rack and pinion ends, rack and pinion mounts, upper and lower ball joints, power steering pump, and hoses for leaks; D.9.E

F remove, clean, inspect, and repack wheel bearings, properly install wheel seals, and adjust wheel bearing pre-load; D.9.F

G inspect shock absorbers and McPherson struts for leakage and performance using jounce and rebound tests; D.9.G

H demonstrate wheel stud replacement and installation of wheel and tire assembly with proper torqueing procedure; D.9.H

I identify and test the Tire Pressure Monitoring Systems (TPMS), both the direct and indirect, for proper operation; D.9.I

J dismount and mount a tire on a wheel and reinstall the assembly, including torqueing the lug nuts; and D.9.J

K rotate tires according to manufacturer recommendations. D.9.K