



(A7) Heating and Air Conditioning Sample Questions and Answers

Answers to these questions are found beginning on page 4 of this document

1. A lack of cooling is being diagnosed. A technician discovers that the high-pressure line is hot to the touch on both sides of the orifice tube. Technician A says that is normal operation for an orifice tube system. Technician B says that the orifice tube may be clogged. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

2. The owner of a vehicle equipped with an orifice tube-type air conditioning system complains that the inside of the vehicle does not cool properly. The air conditioning compressor clutch constantly cycles on and off whenever the air conditioning is on. Technician A says that the system is likely low on refrigerant. Technician B says that the most likely cause is an electrical short in the wiring to the air conditioning compressor clutch. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

3. What two items must be installed or replaced when retrofitting a CFC-12 system to an HFC-134a system?
 - a. Fitting adaptors and a label
 - b. Compressor and O-rings
 - c. Label and the condenser
 - d. Fitting adaptors and the drier

4. An air conditioning performance test is being performed. All of the following should be done except:
 - a. Turn blower to high speed
 - b. Open the doors
 - c. Set the controls for maximum cooling
 - d. Place a thermometer in the inside air inlet door

5. An engine runs normally until the air conditioning is engaged. Then it idles roughly and occasionally stalls. What is the most likely cause?
 - a. A shorted ECT sensor
 - b. A stuck idle air control (IAC)
 - c. A clogged orifice tube
 - d. The air-conditioning system is overcharged

6. A strong pungent odor comes out of the air-conditioning vents. Technician A says that mouthwash should be poured into the air inlet near the windshield to stop the odor. Technician B says that fungicide should be sprayed onto the evaporator to stop the odor. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

7. Technician A says that the air-conditioning compressor should operate when the controls are set to the heat position. Technician B says the air-conditioning compressor should operate when the controls are set to the defrost position. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

8. A condenser is being flushed. Technician A says that the old refrigerant oil can be mixed with and disposed of with used engine oil. Technician B says that refrigerant oil should be added to the new condenser in R-134a systems. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

9. A noisy compressor is being discussed. Technician A says that the air-conditioning system could be low on lubricating oil. Technician B says that the system could be overcharged. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

10. An automotive air-conditioning refrigerant system has been disconnected for several months and is now being returned to service. Technician A says that the receiver drier or accumulator should be replaced. Technician B says the system should be flushed and fresh refrigerant oil should be installed before evacuating and recharging the system. Which technician is correct?
 - a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B

11. After the water pump was replaced and the cooling system refilled with coolant, the heater stopped providing hot air. Which is the most likely cause?
- The wrong concentration of antifreeze was installed
 - An air pocket is trapped in the heater core
 - A defective heater control valve
 - A slipping water pump drive belt
12. Technician A says that the air conditioning compressor clutch may not engage if the steering wheel is being turned sharply and the vehicle is equipped with power steering. Technician B says that the air conditioning compressor clutch may not engage if the refrigerant system is low on charge. Which technician is correct?
- Technician A only
 - Technician B only
 - Both Technicians A and B
 - Neither Technician A nor B
13. A reduced amount of airflow from the air conditioning vents is being discussed. Technician A says that the evaporator could be clogged as a result of a small refrigerant leak causing oil to trap and hold dirt. Technician B says that the blower motor ground connection could have excessive voltage drop. Which technician is correct?
- Technician A only
 - Technician B only
 - Both Technicians A and B
 - Neither Technician A nor B
14. The A/C compressor clutch does not engage. Technician A says that an open high pressure cutout switch could be the problem. Technician B says a blown compressor clutch diode could be the cause. Which technician is correct?
- Technician A only
 - Technician B only
 - Both Technicians A and B
 - Neither Technician A nor B
15. Two technicians are discussing the air-conditioning control circuit shown. Technician A says that the computer (ECM) controls the operation of the compressor clutch. Technician B says that the compressor clutch will not engage if the refrigerant pressure is below 8 psi or higher than 430 psi. Which technician is correct?
- Technician A only
 - Technician B only
 - Both Technicians A and B
 - Neither Technician A nor B

Answers to Sample Questions

- 1. The correct answer is d.** Neither technician is correct. Technician A is not correct because the line after the orifice tube should be cool indicating that the refrigerant has passed through a restriction and is expanding. The temperature also gets cooler as the refrigerant absorbs heat to change states from a liquid to a gas. Technician B is not correct because a clogged or partially clogged orifice tube would stop the flow of refrigerant causing the tube to be hot only on one side of the orifice tube. Answers a, b, and c are not correct because neither technician is correct.
- 2. The correct answer is a.** Technician A only is correct because a rapidly cycling compressor clutch is a common symptom of an air-conditioning system that is low on refrigerant. The compressor engages when the temperature (and pressure) rises, and then stops when the pressure is low. The low pressure is a result of a lack of refrigerant. Technician B is not correct because an electrical short would likely cause a fuse to blow and prevent the compressor clutch from operating entirely. Answers c and d are not correct because Technician A only is correct.
- 3. The correct answer is a.** The gauge fittings must be unique to prevent the possibility of cross contamination between the two types of refrigerants and a label must be attached under the hood identifying the date and who did the retrofit. Answer b is not correct even though many manufacturers recommend that all of the O-rings be replaced. The compressor does not need to be replaced in most cases and therefore, it is not a required item. Answer c is not correct because even though the label must be installed, the condenser is not a required component that must be installed even though some vehicle manufacturers specify that it should be replaced. Answer d is not correct because the fittings must be replaced but the drier does not need to be replaced in all cases even though it is often recommended that it be replaced when retrofitting the system from R-12 to R-134a.
- 4. The correct answer is d.** A thermometer does not need to be placed in the inside air inlet door to perform an air-conditioning performance test because this would simply measure the temperature of the air being drawn back into the system to be cooled and would not be an important factor regarding the performance of the system. Answers a, b, and c are not correct because to perform an air-conditioning performance test, the blower should be on high (answer a), the doors should be open (answer b), and the controls set for maximum cooling (answer c).
- 5. The correct answer is b.** A stuck idle air control (IAC) will not increase the idle speed necessary to keep the engine operating correctly when the load of the air-conditioning compressor is engaged. Answer a is not correct because a shorted engine coolant temperature (ECT) sensor would most likely trigger a diagnostic trouble code and may affect engine operation but not just when the air conditioning is engaged. Answer c is not correct because a clogged orifice tube would reduce the air-conditioning system effectiveness but would not affect the idle speed of the engine. Answer d is not correct because even though an overcharged air-conditioning system would cause a greater load to be placed on the engine, it is not as likely to cause an engine idle problem as answer b.
- 6. The correct answer is b.** Technician B is correct because a fungicide is necessary to kill fungus and mildew growth that can grow on the evaporator fins due to the moist environment. Technician A is not correct because even though most mouthwash contains alcohol, it will not be effective killing fungus and mildew. Answers c and d are not correct because Technician B only is correct.

7. **The correct answer is b.** Technician B is correct. The air-conditioning compressor should engage when the HVAC control is set to defrost because the cool evaporator will cause moisture in the air to condense into liquid water before the air is directed to the windshield, thereby reducing the chances of fogging. Technician A is not correct because even though the air is directed through the evaporator, then through the heater core, very cold air is usually dry air and the compressor does not need to be operating to cool the evaporator when the heat position is selected. Answers c and d are not correct because Technician B only is correct.
8. **The correct answer is d.** Neither technician is correct. Technician A is not correct because refrigerant oil contains traces of refrigerant and is considered to be hazardous if it contains chlorinated hydrocarbons. If this oil were to be mixed with engine oil, the entire quantity of oil has to be handled as hazardous waste. Technician B is not correct because only PAG or ester oil should be used in an R-134a system or damage to the compressor could result. Refrigerant oil does not mix with R-134a and would therefore not be circulated through the system. Answers a, b, and c are not correct because neither technician is correct.
9. **The correct answer is c.** Both technicians are correct. Technician A is correct because a lack of refrigerant oil can cause wear, which could lead to a noisy compressor. Technician B is correct because if the system is overcharged, some liquid refrigerant is likely to be drawn into the compressor causing noise because a liquid is not compressible. Serious damage to the reed valves and other compressor components is also possible. Answers a, b, and d are not correct because both technicians are correct.
10. **The correct answer is a.** Technician A is correct because the moisture in the air has caused the desiccant in the drier to become saturated and unable to provide further protection. Technician B is not correct because even though the refrigerant oil may have absorbed moisture during storage, the desiccant in the drier should be able to keep the formation of acid under control. Some vehicle manufacturers specify that the system should not be flushed because the flushing solvent remaining in the system may do more harm than if the system had not been flushed. Answers c and d are not correct because Technician A only is correct.
11. **The correct answer is b.** Answer b is correct because if air is trapped in the heater core, the coolant cannot flow through and provide heat. This is a common problem because the heater core is usually located at the highest part of the cooling system and air always travels upwards. Answer a is not correct because even though the incorrect concentration of antifreeze in the coolant could affect the freezing protection and heat transfer ability of the coolant, it is unlikely to cause a lack of heat from the heater. Answer c is not correct because even though a defective heater control valve (stuck closed) could cause a lack of heat from the heater, it is unlikely to fail at the same time as the water pump repair and coolant replacement procedure. Answer d is not correct because even though a slipping water pump drive belt could reduce the flow of coolant through the system, it is unlikely to cause a lack of heat from the heater.
12. **The correct answer is c.** Both technicians are correct. Technician A is correct because a power steering pressure sensor usually opens the electrical circuit to the compressor clutch when the power steering pressure rises above 300 psi (2000 kPa) indicating that the vehicle is turning and engine power is needed to drive the power steering pump. Technician B is correct because the low-pressure switch opens the electrical circuit to the compressor if the system pressure drops below a certain point that indicates the system is low on charge to help protect the compressor, which could fail due to lack of proper lubrication if allowed to operate with little if any refrigerant in the system. Answers a, b, and d are not correct because both technicians are correct.

13. **The correct answer is c.** Both technicians are correct. Technician A is correct because airflow would be restricted if dirt clogged the evaporator. The dirt usually will build up if there is a refrigerant leak, which also allows some refrigerant oil to escape. This oil coats the fins of the evaporator and traps dirt eventually restricting the airflow through the evaporator. Technician B is correct because if the blower motor ground had excessive resistance (high voltage drop), then current flow through the blower motor is reduced causing the fan to turn slower than normal, which would reduce the airflow from the vents. Answers a, b, and d are not correct because both technicians are correct.
14. **The correct answer is a.** Technician A is correct because an open high-pressure cutout switch would prevent the operation of the A/C compressor clutch. Technician B is not correct because the diode is used to reduce the voltage spike that occurs when the clutch is disengaged and would not prevent the clutch from engaging. Answers c and d are not correct because Technician A only is correct.
15. **The correct answer is c.** Both technicians are correct. Technician A is correct because the actual electrical connection to ground for the compressor clutch coil relay is inside the computer. When the relay coil is grounded by the computer, the relay coil is energized and current flows from the ignition fuse through the relay contacts to the compressor clutch. Technician B is correct because the compressor clutch coil circuit opens if either the low-pressure switch or the high-pressure switch opens. Answers a, b, and d are not correct because both technicians are correct.