ASE Advanced Engine Performance Specialist Certification (L1) Practice Test (Sample)

Study Guide

BY EXAMZIFY

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Questions

1. If the air-fuel ratio is very lean at high speed (above 16.1), what is a possible cause of the condition?

A. Stuck open thermostat

B. Stuck closed thermostat

C. Both B and D

D. Low cylinder compression

2. What type of engine misfire may you expect with a fouled spark plug?

A. A consistent misfire under load

B. A sporadic misfire during idling

C. No misfire at all

D. An intermittent misfire at any speed

3. A vehicle with a return type fuel system has failed an emissions test with certain readings at idle. Which of the following could cause these readings?

A. An intake manifold vacuum leak

B. A plugged fuel filter

C. A leaking fuel pressure regulator

D. A plugged EGR passage

4. If a transmission is in fail safe mode, will the Torque Converter apply?

A. True

B. False

5. What is a common sign of a malfunctioning MAF sensor?

A. High fuel pressure

B. Excessive smoke from the exhaust

C. Poor acceleration

D. Frequent misfires

6. When is the Torque Converter typically applied in a vehicle?

- **A. Above 35 mph**
- **B. 3rd gear or higher**
- **C. Engine temp higher than 150 degrees F**
- **D. All the above**

7. What is the purpose of the engine control module (ECM)?

- **A. To control air conditioning**
- **B. To manage engine performance and emissions**
- **C. To regulate transmission shifts**
- **D. To monitor tire pressure**

8. Under what vehicle condition will excessive NO emissions be tested to duplicate a concern?

- **A. Idle**
- **B. Heavy acceleration**
- **C. Light acceleration**
- **D. Deceleration**

9. Which answer corresponds with a low compression scenario showing changes in emissions?

- **A. Some increase in HC**
- **B. No change in CO**
- **C. Moderate decrease in CO2**
- **D. Some increase in O2**

10. If an engine has a rough idle and the A/F ratio is fluctuating excessively, what component might be failing?

- **A. Throttle Position Sensor**
- **B. Intake Air Control Valve**
- **C. Fuel Injector**
- **D. Mass Air Flow Sensor**

Answers

1. **C**
2. **A**
3. **C**
4. **B**
5. **C**
6. **D**
7. **B**
8. **C**
9. **A**
10. **D**

Explanations

1. If the air-fuel ratio is very lean at high speed (above 16.1), what is a possible cause of the condition?

A. Stuck open thermostat

B. Stuck closed thermostat

C. Both B and D

D. Low cylinder compression

When dealing with a very lean air-fuel ratio at high speeds, several factors can lead to this condition. A lean air-fuel mixture occurs when there is a higher amount of air compared to fuel, which can cause engine performance issues and potentially damage components over time. One possible cause is a stuck closed thermostat. In this scenario, the engine may not reach optimal operating temperature, which can influence the behavior of the engine management system. The engine control unit (ECU) might receive incorrect temperature signals, leading to a lean fuel mixture being calculated to conserve fuel or reduce emissions, especially when high engine loads or speeds are applied. Low cylinder compression is another contributing factor. Low compression can result from several issues such as worn piston rings, leaking valves, or head gasket failure. This lowered compression can prevent the engine from drawing sufficient fuel into the combustion chamber, contributing to a lean condition, especially evident under high-speed conditions where airflow increases. Both conditions can indeed lead to a very lean mixture at high speeds. A stuck closed thermostat limits the engine's ability to heat up properly, while low cylinder compression limits the engine's ability to effectively draw in the air-fuel mixture. Therefore, recognizing that both a stuck closed thermostat and low cylinder compression can lead to

2. What type of engine misfire may you expect with a fouled spark plug?

A. A consistent misfire under load

B. A sporadic misfire during idling

C. No misfire at all

D. An intermittent misfire at any speed

A fouled spark plug typically leads to a consistent misfire, particularly under load. This occurs because a fouled plug can no longer create a strong enough spark to ignite the air-fuel mixture efficiently. When an engine is under load, such as during acceleration or climbing a hill, the demand for power increases, requiring a consistent and strong spark to maintain performance. If the spark plug is fouled, the combustion process is compromised, resulting in a repeatable and noticeable misfire as the engine struggles to perform. In contrast, under lighter conditions, such as idling, the effects of a fouled spark plug might not be as pronounced, which could lead to less frequent or sporadic misfires. The engine could still manage to run at low RPMs but under heavier conditions, its efficiency wanes. Therefore, a consistent misfire under load is the most characteristic symptom of a fouled spark plug in a functioning engine.

3. A vehicle with a return type fuel system has failed an emissions test with certain readings at idle. Which of the following could cause these readings?

A. An intake manifold vacuum leak

B. A plugged fuel filter

C. A leaking fuel pressure regulator

D. A plugged EGR passage

In a return type fuel system, the fuel pressure regulator plays a critical role in maintaining the appropriate fuel pressure for the engine. If the fuel pressure regulator is leaking, it can introduce excessive fuel into the intake manifold, which can lead to a rich fuel mixture. A rich fuel mixture causes incomplete combustion, resulting in higher levels of unburnt hydrocarbons, carbon monoxide, and possibly increased levels of nitrogen oxides during emissions testing, especially at idle when the engine is operating under stoichiometric conditions. The other options, while they could impact engine performance, are less directly associated with high emissions readings. An intake manifold vacuum leak typically leads to a lean condition, which may reduce hydrocarbons but can increase NOx emissions. A plugged fuel filter restricts fuel flow, which could cause performance issues but would not necessarily lead to failed emissions readings in a consistent manner. A plugged EGR passage, while it could lead to increased NOx emissions by not allowing exhaust gas recirculation, would not cause the same rich condition that leaking fuel pressure regulators can produce. Thus, the leaking fuel pressure regulator is the most likely cause of the emissions failures due to its direct effect on the fuel mixture in the combustion chamber.

4. If a transmission is in fail safe mode, will the Torque Converter apply?

A. True

B. False

When a transmission is in fail-safe mode, it is designed to limit functionality to prevent further damage or adverse operating conditions. In this mode, the system typically disables certain functions, including the application of the torque converter clutch. The main purpose of fail-safe mode is to ensure the vehicle can still operate, but in a limited capacity, often with reduced power and efficiency. This means that the torque converter clutch, which helps improve fuel efficiency by locking the converter in direct drive, will not apply when the vehicle is in this mode. By not applying the torque converter, the system helps to avoid potential overheating or damage that could occur from malfunctioning components. Thus, the correct understanding of fail-safe mode is that it leads to the non-application of the torque converter.

5. What is a common sign of a malfunctioning MAF sensor?

- A. High fuel pressure
- B. Excessive smoke from the exhaust
- C. Poor acceleration
- D. Frequent misfires

A malfunctioning Mass Air Flow (MAF) sensor can significantly disrupt the air-fuel mixture that is crucial for engine performance. When the MAF sensor is faulty, it may send incorrect airflow data to the Engine Control Unit (ECU), leading to an improper fuel calculation. This results in a lean or rich fuel mixture, which can manifest as poor acceleration. This issue often arises because the engine is not receiving the correct amount of fuel needed to match the volume of air entering the engine. Consequently, the vehicle may hesitate or struggle to gain speed, impacting overall driving performance and indicating a clear link between the MAF sensor's functionality and the vehicle's acceleration capabilities. Other symptoms, like excessive smoke from the exhaust or frequent misfires, may relate to other engine issues rather than the MAF sensor specifically, which is why they do not serve as common indicators in this context. High fuel pressure is typically associated with fuel system issues and does not directly correlate with MAF sensor problems.

6. When is the Torque Converter typically applied in a vehicle?

- A. Above 35 mph
- B. 3rd gear or higher
- C. Engine temp higher than 150 degrees F
- D. All the above

The torque converter plays a crucial role in a vehicle's automatic transmission system by allowing the engine to run at a different speed than the transmission. It typically engages under several conditions to optimize performance and efficiency. When combined, the conditions mentioned in the options illustrate when the torque converter is beneficial. At speeds above 35 mph, the torque converter can efficiently lock up to reduce slip and improve fuel economy. Engaging it in 3rd gear or higher allows for better power transfer during highway speeds, where maximum efficiency is paramount. Moreover, the torque converter often requires the engine to reach a certain operating temperature, generally around 150 degrees Fahrenheit, to ensure optimal performance and prevent damage due to cold fluid. Each of these individual conditions plays a part in how and when the torque converter operates, making "all of the above" the correct choice, as it accurately encompasses the various scenarios under which the torque converter is applied. This comprehensive understanding is fundamental for those studying advanced engine performance, as it highlights the torque converter's role in enhancing overall vehicle efficiency and functionality across different driving conditions.

7. What is the purpose of the engine control module (ECM)?

A. To control air conditioning

B. To manage engine performance and emissions

C. To regulate transmission shifts

D. To monitor tire pressure

The engine control module (ECM) serves a fundamental role in managing engine performance and emissions, making it essential for the efficient operation of the vehicle's powertrain. The ECM is a computer that uses information from various sensors throughout the engine and vehicle systems to optimize the combustion process, leading to improved fuel efficiency and reduced emissions. By constantly monitoring factors such as air-fuel mixture, ignition timing, and engine temperature, the ECM adjusts these parameters to achieve the best possible performance under varying driving conditions. This capability not only enhances engine efficiency but also helps ensure that the vehicle complies with emissions regulations, thereby reducing pollutants released into the atmosphere. While the other options touch on important vehicle functions, they are not the primary focus of the ECM. Air conditioning controls and transmission shifts are managed by different modules, such as the HVAC control module and transmission control module, respectively. Monitoring tire pressure is typically handled by a Tire Pressure Monitoring System (TPMS), which operates independently from the ECM. Thus, the ECM's core function is specifically centered on managing engine performance and emissions.

8. Under what vehicle condition will excessive NO emissions be tested to duplicate a concern?

A. Idle

B. Heavy acceleration

C. Light acceleration

D. Deceleration

Excessive nitrogen oxide (NOx) emissions are typically linked to specific driving conditions that promote high combustion temperatures. Light acceleration is an important condition for testing NO emissions because it often represents a scenario where the engine operates at a relatively high load but not at full throttle. During light acceleration, the fuel-air mixture can become leaner, resulting in higher combustion temperatures and increased formation of NOx as a byproduct of combustion. In contrast, at idle, the engine is not under significant load, which can result in lower combustion temperatures and reduced NO emissions. Heavy acceleration tends to lead to richer fuel mixtures, which also decreases NOx production. During deceleration, the engine may enter fuel-cut-off mode or operate at a stoichiometric or even rich mixture, further reducing NOx emissions. Thus, light acceleration is a critical condition to duplicate when testing for excessive NOx emissions, as it best simulates the engine conditions under which these emissions may increase significantly.

9. Which answer corresponds with a low compression scenario showing changes in emissions?

A. Some increase in HC

B. No change in CO

C. Moderate decrease in CO2

D. Some increase in O2

In a low compression scenario, it's essential to understand how engine performance and emissions are affected. When compression is low, the combustion process can be incomplete, leading to higher levels of unburned hydrocarbons (HC) in the exhaust. This happens because the mixture of fuel and air may not ignite completely or the combustion process may not reach the optimal temperature and pressure needed for full combustion. An increase in hydrocarbons is a common indication of incomplete combustion, which can occur due to various factors associated with low compression, such as worn piston rings, damaged cylinder walls, or leaking valves. These issues prevent the engine from achieving efficient combustion, resulting in more HC being emitted into the atmosphere. Other emission components may not show notable changes in this scenario. For example, CO emissions might remain stable if the air-fuel ratio remains similar even if combustion efficiency is reduced. CO2 levels may decrease because less fuel is being burned effectively, directly correlating with a potential reduction in the combustion process. Lastly, O2 levels might increase, reflecting unburned oxygen due to an incomplete combustion process, but that does not directly relate to the primary impact of increased HC emissions from low compression. Thus, the correct answer relates directly to the expected behavior of hydrocarbon emissions when

10. If an engine has a rough idle and the A/F ratio is fluctuating excessively, what component might be failing?

A. Throttle Position Sensor

B. Intake Air Control Valve

C. Fuel Injector

D. Mass Air Flow Sensor

When an engine experiences a rough idle accompanied by an excessively fluctuating air-fuel (A/F) ratio, it indicates that there may be issues with how the engine is managing the air entering the combustion chamber. The Mass Air Flow (MAF) Sensor is crucial in determining the exact amount of air entering the engine, allowing the engine control unit (ECU) to adjust fuel delivery appropriately. If the MAF sensor is failing or providing inaccurate readings, it can lead to poor engine performance, reflected by an unstable idle and fluctuating A/F ratios. A faulty MAF sensor can miscalculate the amount of air entering the engine, resulting in either too much or too little fuel being injected. This imbalance directly contributes to the rough idle condition and the noticeable fluctuations in the A/F ratio. While other components, such as the throttle position sensor, intake air control valve, and fuel injectors, can also impact idle quality and A/F ratios, they typically manifest in different ways or lead to specific engine performance issues that differ from those caused by MAF sensor failure. Thus, when faced with the symptoms of a rough idle and fluctuating A/F ratio, the most likely culprit to investigate first is the MAF sensor.