Automotive Engines 10th

Chapter 21 Engine Condition Diagnosis

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1. What is the test procedure for determining if the exhaust system is restricted (clogged) using a vacuum gauge?

2. What visual checks should be performed on an engine if a mechanical malfunction is suspected?

3. How can a vacuum gauge indicate if the valves guides are worn?

4. How can a compression test determine what is wrong with an engine?

5. List three items that could cause engine noises.

6. How is a cylinder leakage test performed?

Answer Key
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1. A clogged (restricted) exhaust would be indicated on a vacuum gauge as a drop in engine vacuum if the engine speed is held at 2,000 to 2,500 RPM.
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2. The visual inspection items that should be performed as a part of a diagnosis include oil level and condition, coolant level and condition, checking for oil leaks, and listening carefully for abnormal engine noise.
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3. A rapidly vibrating needle at idle that becomes steady as engine speed is increased indicates worn valve guides.
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4. An engine can loose compression from leaking intake or exhaust valves, piston rings (or piston, if there is a hole), or cylinder head gasket.
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5. Excessive engine noise can be caused by a defective accessory drive belt, cracked flexplate, or loose torque converter.
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6. To perform the cylinder leakage test, take the following steps:

   STEP 1 For best results, the engine should be at normal operating temperature (upper radiator hose hot and pressurized).
   STEP 2 The cylinder being tested must be at top dead center (TDC) of the compression stroke.
   STEP 3 Calibrate the cylinder leakage unit as per manufacturer's instructions.
   STEP 4 Inject air into the cylinders one at a time, rotating the engine as necessitated by firing order to test each cylinder at TDC on the compression stroke.
   STEP 5 Evaluate the results:
   Less than 10% leakage: good
   Less than 20% leakage: acceptable
   Less than 30% leakage: poor
   More than 30% leakage: definite problem
   STEP 6 Check the source of air leakage.
   a. If air is heard escaping from the oil filler cap, the piston rings are worn or broken.
   b. If air is observed bubbling out of the radiator, there is a possible blown head gasket or cracked cylinder head.
   c. If air is heard coming from the throttle body or air inlet on fuel-injection-equipped engines, there is a defective intake valve(s).
   d. If air is heard coming from the tailpipe, there is a defective exhaust valve(s).
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