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## PRACTICE PAPER - ANSWER BANK

### **Assessors Note:**

**This answer bank should be used as the primary resource when marking students work. However, responses to some questions may be subjective and tutors are advised to exercise their professional judgement when making assessment decisions.**

## ELEMENT ONE

Demonstrate knowledge of disassembling an engine.

**1.A** Identify 5 safety precautions when disassembling and reassembling an engine?

- 1 Ensure Motor is securely mounted on an approved engine stand.**
- 2 All PPE gear must be worn throughout the task.**
- 3 Ensure the work area is clean and there is sufficient space to work around the engine stand.**
- 4 Always follow manufacturers recommended procedures.**  
**Note: Other answers may be acceptable if approved by the supervisor.**

**1.B** What is the correct procedure to clean the engine assembly to remove oil and dirt and what equipment would be required?

**A steam cleaner, water blaster and suitable engine degreaser.**

2. What tools and equipment are often used when disassembling an engine?

Tools:

**Socket set, screwdriver set, various pullers, various combination spanners, parts trays, hammer, valve spring compressor.**

Equipment:

**Engine Stand, Inspection lamp, engine lifter,**

3. In the boxes below number the correct dismantling procedure for a 4 cylinder petrol engine?

<b>9</b>	<b>Remove Pistons and connecting rods</b>	<b>6</b>	<b>Remove cylinder head Assembly</b>
<b>10</b>	<b>Remove crankshaft Assembly</b>	<b>3</b>	<b>Remove Rocker cover</b>
<b>4</b>	<b>Remove Camshaft and rocker assemblies</b>	<b>8</b>	<b>Remove Oil pump</b>
<b>7</b>	<b>Remove sump</b>	<b>1</b>	<b>Remove ancillary components</b>
<b>5</b>	<b>Remove cylinder head bolts</b>	<b>2</b>	<b>Remove the Cam belt covers and cambelt.</b>

4. Explain the procedure to remove and disassemble the cylinder head and valves?

**Remove Rocker cover, ensure engine is at TDC no 1 and remove cambelt assembly, remove rocker arms and camshaft, remove cylinder head bolts as per manufacturer's specifications, remove cylinder head assembly and remove valve springs, valve retainers and valves.**

5. How should pistons, valves and camshaft bearing caps be stored to ensure correct reassembly?

**On a clean area of the bench and parts should be placed in a numbered order from the front of the engine to the last cylinder.**

6. What equipment would be used to clean the following engine components?

**Cylinder Head Assembly:** Steam cleaner or a Parts wash machine, water blaster and suitable degreaser.

**Sump:** parts wash machine.

**Piston and Connecting Rods:** Parts wash machine and wire brush for carbon deposits on piston crown and ring grooves.

**Crankshaft Assembly:** Parts wash machine.

**Valves and springs:** valves to be cleaned with a wire brush to remove all carbon deposits

**Cylinder Block:** Steam cleaner or water blaster and suitable degreaser.

**Cylinder Head Bolts:** Parts wash machine.

## ELEMENT TWO

Demonstrate knowledge or reassembling an engine to a running state.

1. List five tools that would be used when assembling a motor?

**Socket set, screw driver set, hammer, piston ring compressor, combination set spanners, torque wrench, valve spring compressor.**

2. List 2 items of equipment used when assembling a motor?

**Engine stand, cylinder bore hone and drill, inspection light, lifting equipment.**

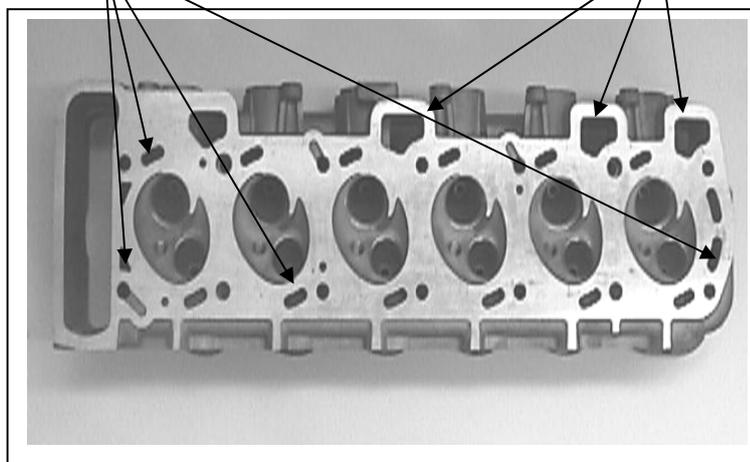
3. Give a method of cleaning parts of a dismantled engine and protecting them from corrosion?

**All parts can be cleaned in a parts wash machine. Heavier components such as the engine block and cylinder head by steam cleaning or use of a waterblaster. Once clean and dry a light film of oil needs to be applied to prevent corrosion then stored in a cool dry place.**

4. In the illustrations below identify the cooling and oil galleries of both the engine block and the cylinder head?

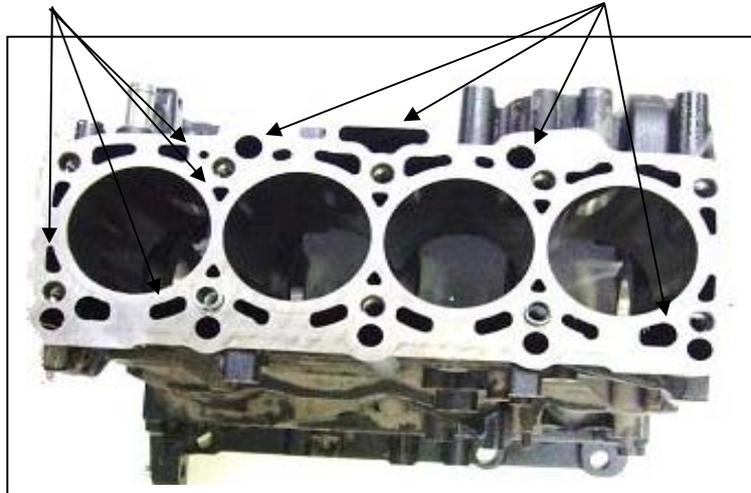
Cooling Galleries with a 'X'

Oil Galleries with a 'O'



Cooling Galleries with a 'X'

Oil Galleries with a 'O'



5. Describe the flow of lubricating oil from the sump to the top of a 4 cylinder engine?

**Sump – oil filter- crankshaft main and big end bearings – some spray to cylinder walls – cylinder head – camshaft bearings – camshaft drive gear and valve lifters to cam lobes.**

6. In the left hand column of the table below list the correct order for assembling an engine?

3	<b>Install oil pump assembly and sump.</b>
7	<b>Fit both intake and exhaust manifolds with new gaskets.</b>
8	<b>Fit water pump, install cambelt and tension to correct settings and fit cambelt covers.</b>
2	<b>Lubricate cylinder bores, install pistons and connecting rods in the correct numerical order and secure the connecting rods to the crankshaft.</b>
1	<b>Install crankshaft and main bearing caps and torque to manufacturers specifications.</b>

4	<b>Fit a new cylinder head gasket and secure cylinder head to block ensuring correct torque and installation method as per manufacturer's specifications.</b>
5	<b>Fit camshaft to cylinder head and secure to correct torque. Install rocker arms and set valve clearances.</b>
6	<b>Install valve cover with new gasket and secure to correct torque.</b>

6. What is the correct sequence when tightening crankshaft and camshaft bearings caps?

**Always start tightening from the centre position bearing caps and work your way to the outer edges.**

7. What is the correct tightening sequence for cylinder head bolts if no workshop manual is available?

**The correct procedure is to start tightening from the centre bolts of the cylinder head and work in a circular or spiral fashion to the outer bolts. The final torque should be done in 2 or 3 stages.**

8. You have been asked to set the valve clearances for a 4 cylinder engine. Describe what method you would use?

**Adjustment should be carried out in the firing order where possible. No 4 cylinder valves to be rocking (exhaust closing and intake opening) and the opposing cylinder No 1 is ready to be set with piston on compression and TDC. Then:**

**No 1 rocking and set 4, No 2 rocking and set 3, and No 3 rocking and set 2.**

9. Why is a clearance required between the crankshaft journal and main bearing?

**This clearance is for oil pressure to supply a film of oil between the moving parts.**

10. How can this clearance be measured?

**This clearance can be measured on engine reassembly with a product called plasti-gauge.**

11. You have finished fitting a rebuilt engine back into the engine bay. Give 2 important tasks to do with the cooling system before starting the engine?

**Pressure test and add the correct quantity of anti-freeze.**

12. The engine will have no oil pressure for a short time when first started. What can you do before starting to ensure oil pressure will be provided by the oil pump quickly?

**The oil filter can be filled with oil before starting and the engine primed by operating the starter with ignition system disabled till the oil pressure warning light has gone out.**

13. Once the engine has been started and run to operating temperature what checks will now need to be done?

**The ignition timing will have to be checked and set to manufacturer's specifications. Check for oil leaks and any un-wanted noise from engine components. Once engine is warm valve adjustment may need to be re-checked.**

