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**Internal Assessment Test 1 – March 2018**

Sub:	Automobile Engineering				Sub Code:	15ME655	Branch:	ME	
Date:	13/03/18	Duration:	90 min's	Max Marks:	50	Sem / Sec:	VI/A&B	OBE	
<u>Answer any FIVE FULL Questions</u>									
							MARKS	CO	RBT
1	Explain dry liner and wet liners with neat sketches.						[10]	CO1	L2
2	Explain any one valve actuating mechanism with a neat sketch.						[10]	CO1	L2
3	Explain the objectives of lubrication in engine? Explain splash lubrication with a neat sketch.						[10]	CO1	L2
4	Explain the disadvantages of air cooling? Explain thermosyphon cooling with a neat sketch.						[10]	CO1	L2
5	Explain positive crankcase ventilation with a neat sketch.						[10]	CO5	L2
6	Explain ECS for Fuel injected engines.						[10]	CO5	L2
7	Explain any five methods of controlling piston slap.						[10]	CO1	L2

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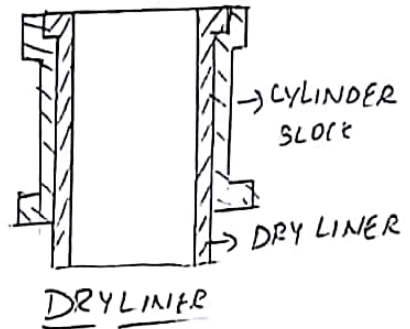
# Linners (sleeves)

①

Engineer make use of removable liners which are pressed into cylinder holes. The cylinder liners are in the form of barrels & used to reduce the cylinder wear & hence increase bore life. When the liners wore out that can be replaced easily. It is made up of special alloy containing silicon, manganese, nickel & chromium.

There are 2 types of liners used

① Dry liners :- ① Dry liners are quite thin & use block metal to give it full length support. ② It is made in the form of barrel & both the surfaces must be



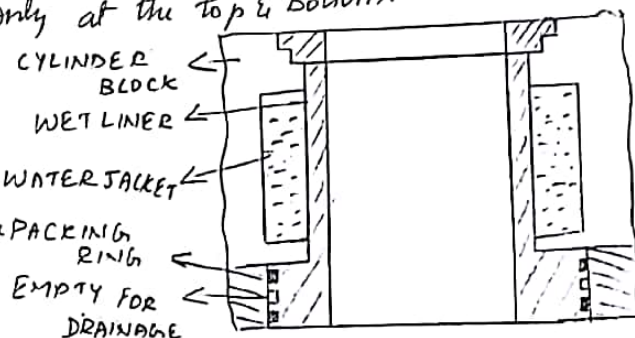
5M

be machinized accurately to make complete contact with the cylinder block to dissipate the heat.

③ If it is fit loosely than it results in poor dissipation of heat then increases the operating temperature & results in piston scuffing.

② Wet liners :- ① This type of liners have direct contact with the cooling jacket ② It is press fit into the cylinder bore & is supported only at the top & bottom.

③ Since the outer surface does not make contact with the cylinder bore so <sup>no</sup> need to machinized the outer surface



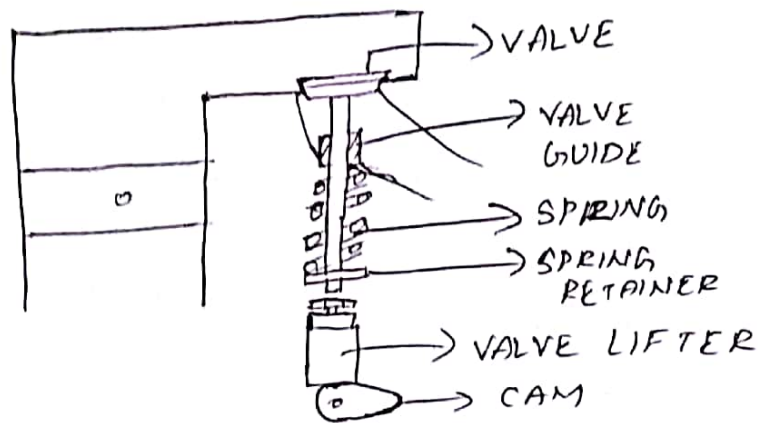
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④ These liners have direct contact with water jacket

hence coated to aluminium to make it corrosion resistant & proper <sup>rubber</sup> packing rings are provided for tight seal.

10 Marks

## ② VALVE timing diagram



### SIDE VALVE ACTUATING MECHANISM

This mechanism is used in L-head engines

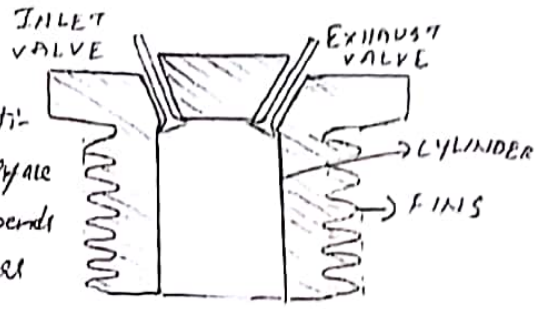
The parts required are valve, valve guide, Spring, Spring retainer, valve lifter / valve tappet & cam shaft. In this type inlet & exhaust valves are mounted in a single row & operated from the same crankshaft.

As the apex position of the cam makes contact with the valve lifter it pushes the ~~valve~~ valve against the spring force. The valve guide helps in guiding the valve into the ~~the~~ valve seat. 6 Marks

This mechanism is obsolete due to complicated shape of the combustion chamber which leads to detonation.

### 3) Air cooling

Here the air stream flows continuously over the heated metal surface & the rate of heat dissipation depends on surface area of metal, air mass flow rate, thermal conductivity of metal, temperature difference between metal surface and air.



CYLINDER WITH FINS

To increase the effectiveness, the metal surface area which is in contact with air should be increased. This is done by providing fins over cylinder barrels. The fins may be cast integral with the cylinder or may be attached separately.

(4) Marks

#### Disadvantages

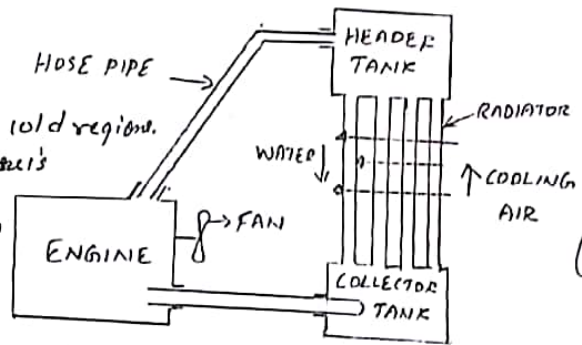
- 1) It is more noisy
- 2) Heat transfer coefficient for air is less
- 3) Distortion of cylinder may occur due to uneven cooling all around the cylinder.

#### Advantages

- 1) Less no. of parts so less weight
- 2) Air cooled engines are useful in extreme climates.
- 3) Easy for maintenance
- 4) The engine warms up easily.

### 4) Thermosiphon system

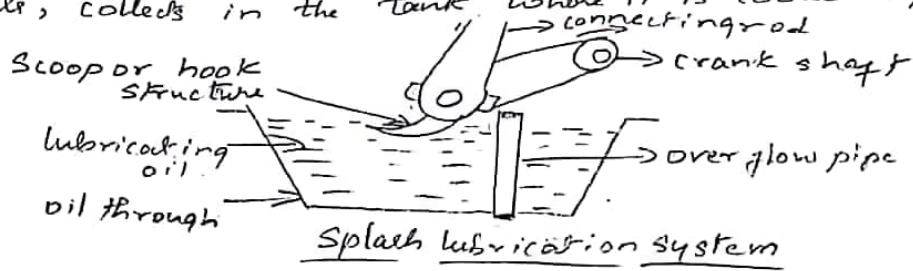
In this system the flow of cooling water is due to the differences in densities of hot & cold regions. Here the engine water jacket's ~~is~~ connected to the radiator through these pipes. The water absorbs the heat from engine & flows through the radiator where the air is flowing through fan makes the ~~air~~ water to cool down & collected into collector tank & cycle continues.



THERMOSYPHON COOLING SYSTEM

(6) Marks

4) Splash lubrication system:- It is the cheapest method of lubrication & was used in early motorcycles. The lower end of the connecting rod consists of a scoop like structure. The oil is stored in the oil through. When the engine runs the connecting rod oscillates & scoop takes the oil from oil through & splashes on to the cylinder walls each time when it passes through BDC position. This lubricates engine walls, guide on pin, main crankshaft bearings, big end bearings etc. The oil stripping from the cylinder walls, collects in the tank where it is cooled by airflow.



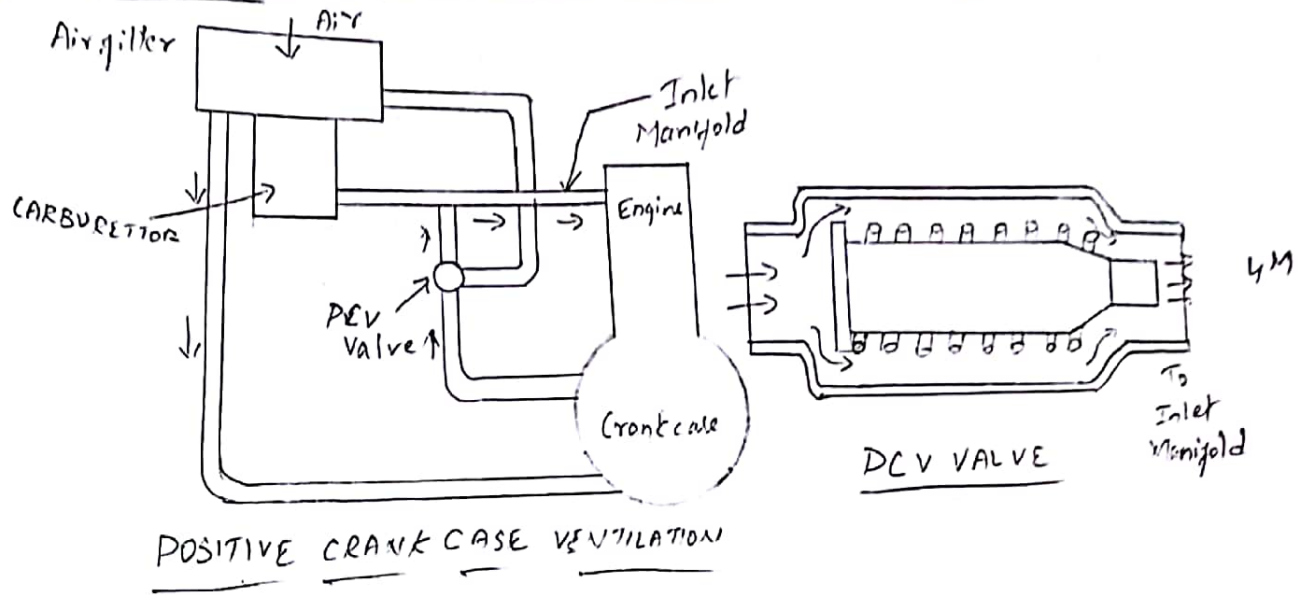
6) Marks

### Objective of lubrication

- 1) It reduces power loss by minimising friction between moving parts
- 2) Decreases wear & tear of the moving components.
- 3) It also acts like cooling agent by carrying the heat from hot moving parts
- 4) It give cushioning effect against shocks during combustion
- 5) It act as cleaning agent by absorbing all the impurities & oil may be further purified by filtration. (4) Marks
- 6) ~~Seal~~ It acts as a sealing action by maintaining an effective seal on the piston rings & avoids entry of high pressure gases into the crank case.

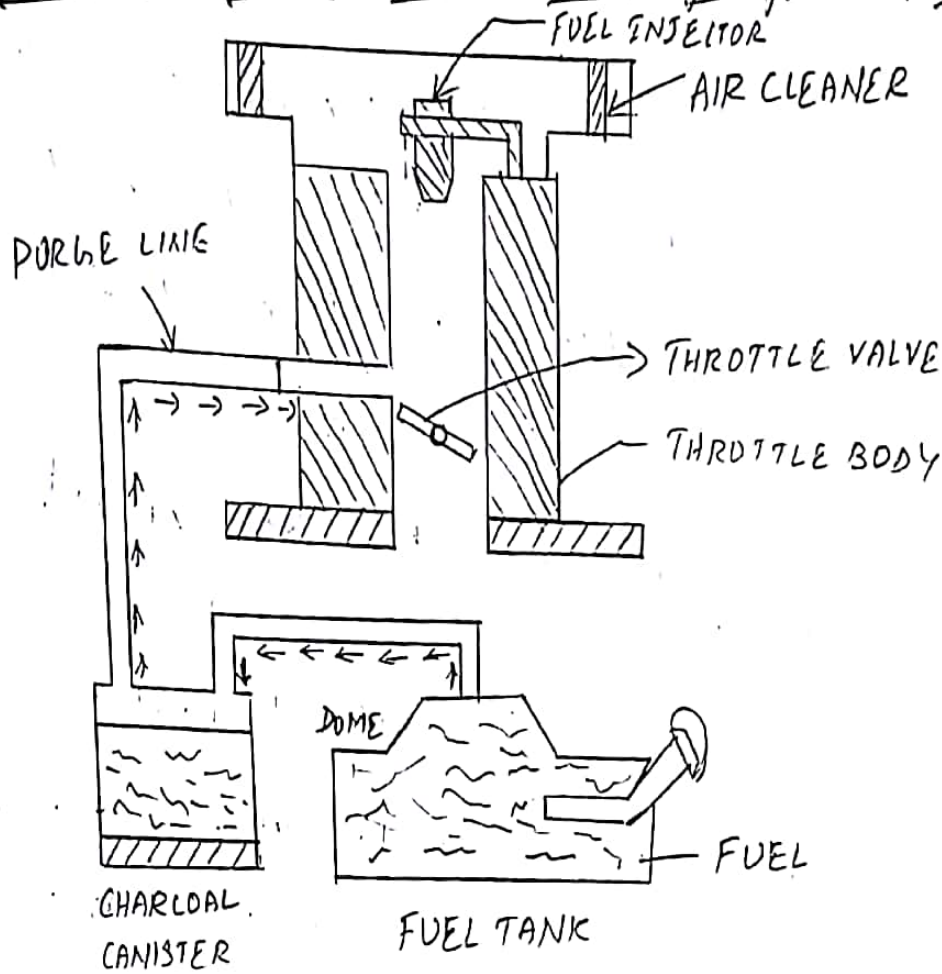
## Closed Crank case Ventilation

### 5) Positive Crank case Ventilation Systems [PCV Systems]



- 1) When the engine is running some unburned fuel & combustion products leak past the piston rings into the crankcase it is called blow by.
- 2) The blow by gases must be removed before it condensed with lubricating oil & forms into sludge.
- 3) Sludge corrodes the engine parts & clog the oil lines
- 4) To remove the blow by gas the filtered air from air filter is sent to crankcase which mixes with blow by gas
- 5) To avoid atmospheric pollution modern engines have PCV val. 6M
- 6) PCV valve has spring loaded tapered valve
- 7) The PCV valve regulates the flow of blow by gases to the air manifold which will go back to the Air filter.
- 8) During idle or deceleration amount of blow by gases will be less and small PCV valve opening is needed
- 9) Likewise depending on the speed of the engine the PCV valve operates.
- 10) So that the pollution due to the blow by gases is controlled.

6) Evaporative Control system (ECS) for fuel injected engine



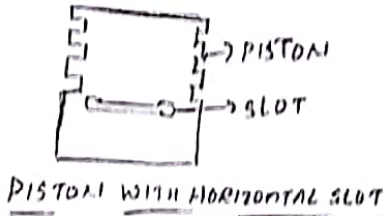
ECS for an engine with throttle body injection

The fuel injection system do not have float bowl, therefore ECS controls escape of fuel vapours from the fuel tank only. The canister is connected to hole from the fuel tank. The purge line from the canister is connected to the throttle body. An electric purge control solenoid may be used instead of vacuum operated purge valve. The solenoid valve may be fitted on the canister or in the purge line & is normally open.

7) Control of piston slap

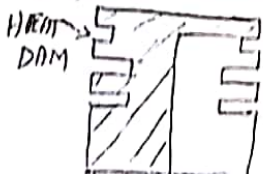
These of aluminium alloys piston with cast iron cylinder has a drawback of engine piston slap. Since the difference between their thermal coefficient of expansion  $\alpha$  cold shrinkage.

Cutting horizontal slot :- This method keeps the heat away from the lower part of the piston by cutting horizontal slot in the portion below the oil control ring. The skirt portion does not become hot & hence reduce the slap.



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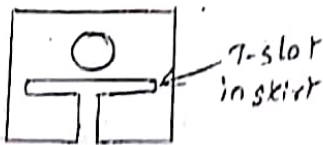
b) Heat dam :- By making the heat dam i.e. by cutting a groove near the top of the piston the heat flow to lower part of piston can be reduced. Hence the skirt runs cooler & does not expand.



Heat dam construction

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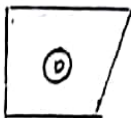
c) Vertical T-slot :- In this type a slot in the shape of T is made in skirt portion. The top portion of T retards the heat transfer from head to the skirt & if skirt expands it expands to the inner side. However decreases mechanical strength.



(2) M

d) Split skirts :- In a split skirt piston, skirt is either partially or completely split. When the piston warms and begins to expand it cannot bind in the cylinder since the skirt merely closes the split.

e) Tapered piston :- Some times the pistons are turned taper such that the crown is bigger & the skirt is smaller in diameter. And it becomes uniform due to increase in temperature under operating conditions.



(2) M