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LUBRICATION SYSTEMS

6.1 Lubrication :- It is a phenomenon in which friction between moving / sliding / rolling surfaces is reduced by inserting a thin layer of substance called lubricant.

6.2 Methods of Lubrication

A. Methods of Lubricating different parts of Machine tools :-

1. Manual System of Lubrication

In this system, lubricants are directly inserted in the oil holes with the help of oil cans or hand guns. Satisfactory lubrication is obtained but it can't be determined whether right quantity has reached at right place without contamination.

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2. Reservoir System of Lubrication

In this system, there is a special type of reservoir in which lubricant is fed with simple methods such as drip feed or syphon feed.
For lubricating gears, splash system is used.

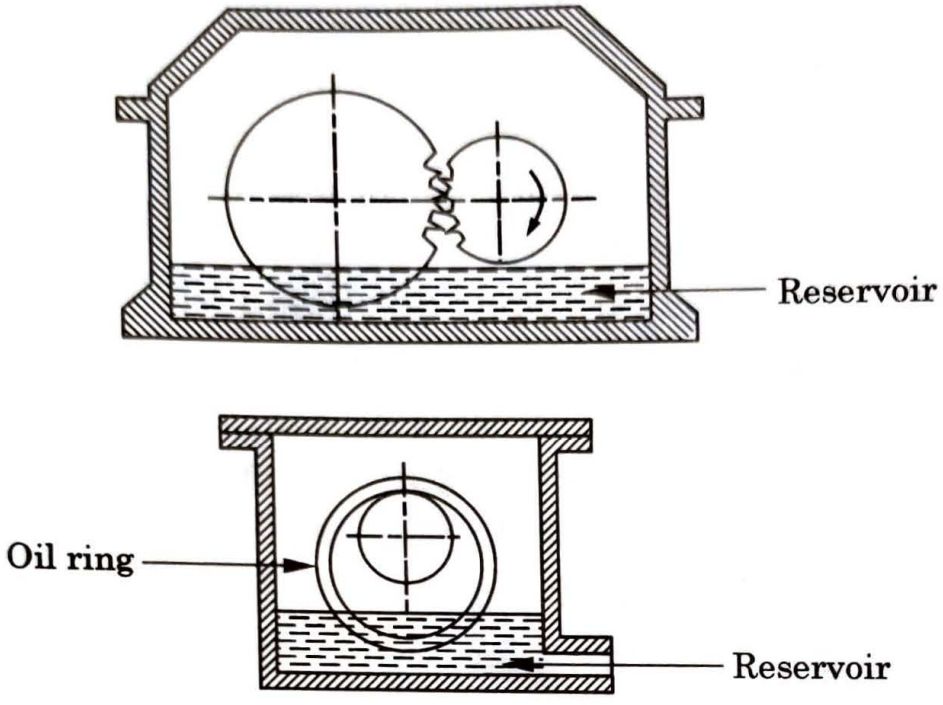

Fig. 6.1(*a*): Oil Supply from Reservoir

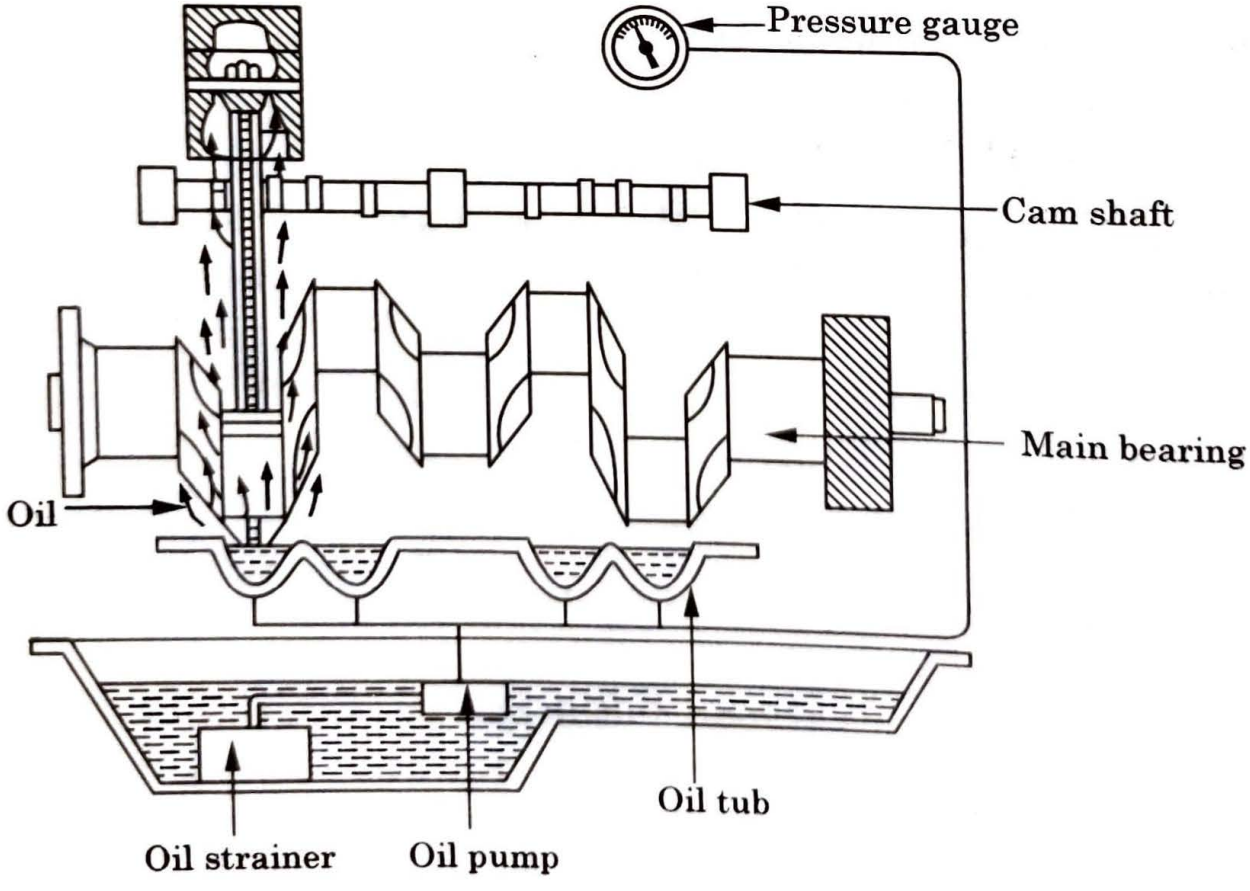

Fig. 6.1(*b*): Splash System

3. Pump system of lubrication

Lubricating oil is fed under pressure with the help of a pump. In this system, there is an oil reservoir which is filled with lubricating oil. The oil is supplied to the distribution tray under pressure from where bearings & gears are lubricated through oil pipes & oil ways.

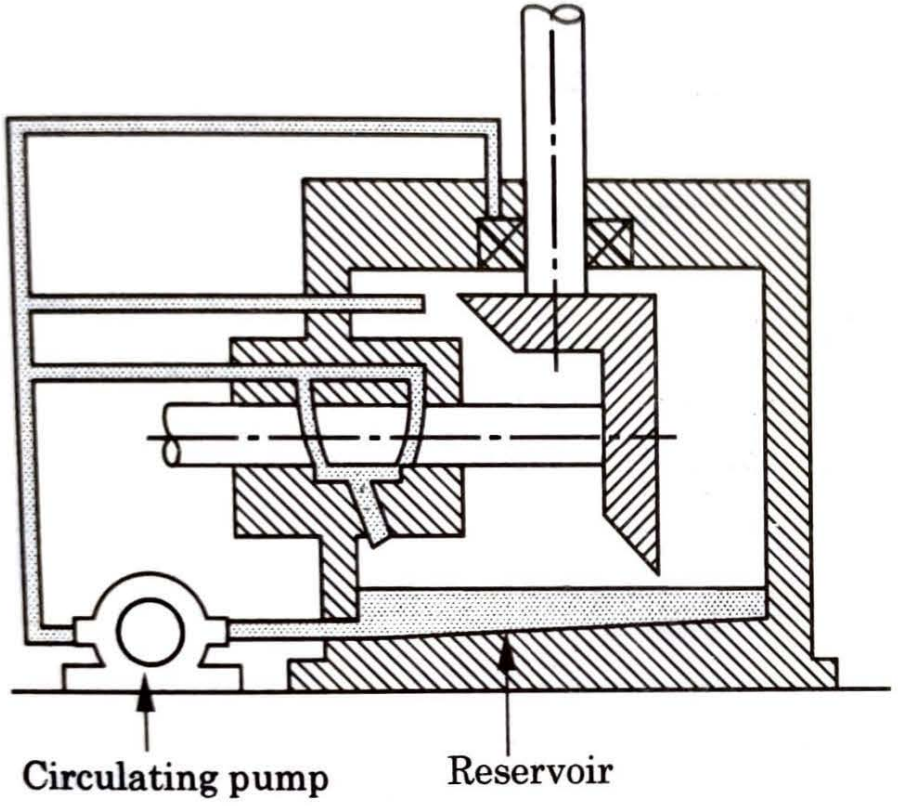

Fig. 6.2: Circulating system

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4. Automatic System of lubrication

This system is more advance than pump system of lubrication. In this system, lubricating oil after filtering is supplied to all the points of lubrication under pressure with the help of pump at right time.

B. Methods of lubrication used in manufacturing operations

1. Thick film lubrication
2. Thin film lubrication

1. Thick film lubrication

In this, the moving / sliding surfaces are separated from each other by a thick film of lubricant so that direct surface to surface contact & welding of junctions

do not occur. The lubricant film covers / fills the irregularities of the sliding / moving surfaces & forms a thick layer in-between them. This consequently reduces wear.

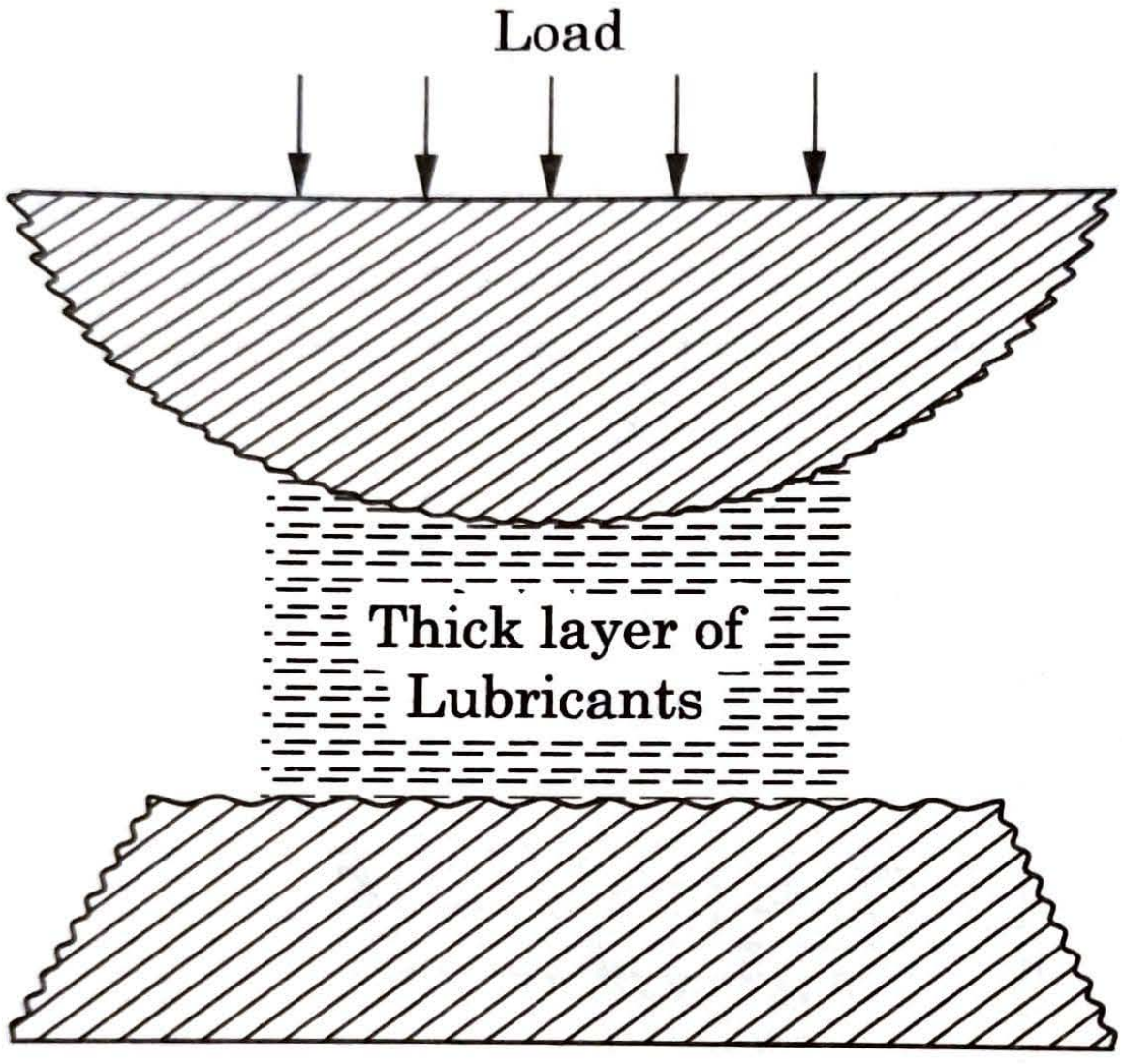

Fig. 6.3 : Thick Film Lubrication

2. Thin film lubrication

This type of lubrication is done when a continuous film of lubricant cannot persist and direct metal to metal contact is possible.
Under these conditions, the clearance space b/w the moving or sliding surfaces is lubricated with an oil lubricant, a thin layer of which is adsorbed by both the metallic surfaces. These adsorbed layers of the lubricant help to avoid direct metal to metal contact. The load is carried by these adsorbed layers on both the metal surfaces.

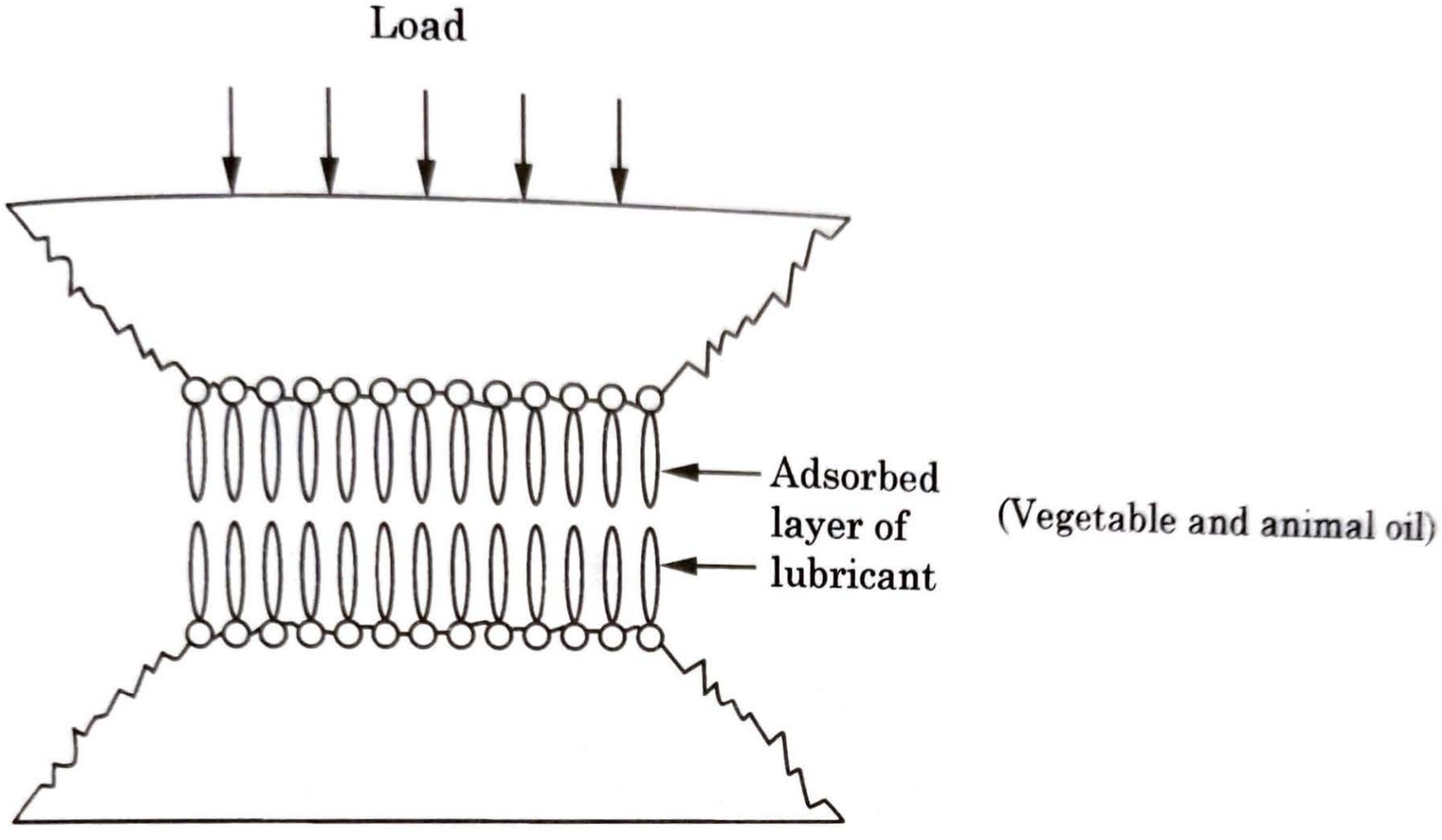

Fig. 6.4: Thin Film Lubrication

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6.3 Storage and Handling of Lubricants

→ Outdoor storage

→ When packages are stored out-of-doors, it should be considered a temporary measure. A temporary shelter should be provided, if shelter is not possible, tarpauline should be spread for protection.

→ Floor area should be given a slight slope for the draining of water, etc.

→ The drum should always be placed on the sides on wooden planks to keep them clear of ground & prevent rusting.

→ Regular inspection should be carried out with a view to detect leakage.

→ Drums of different grades of lubricants should be stacked separately and suitable sign ~~boric~~ boards bearing the names of the brands should be provided near each stock.

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→ Indoor Storage

→ Suitable racks should be provided for stocking of oil cans when not in use.

→ Suitable cocks should be fitted in small holes of the drums for the withdrawl of oil.

→ Metallic trays be provided to catch the oil drips to be filtered and re-used.

→ Boards bearing the name and make of the lubricant should be hung behind each drum for easy identification.

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6.4 Lubricant Conditioning & Disposal

→ The process of lubricant conditioning can be divided into three categories:-

(i) Removing contaminants
(ii) Refreshing additive system
(iii) Restructuring additive system

(i) Removing Contaminants :-

→ Filters or other technologies are used to separate contaminants such as solid particles, moisture, etc. from the lubricants. Acids, glycol, fuel particles & other chemicals are the contaminants which are very difficult to separate from the lubricants.

→ The use of technologies to separate the contaminants is largely limited to large circulating oil systems such as turbines, paper machines, hydraulic machines, etc.

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(ii) Refreshing Additive system :-

Refreshing additive system is the second category of lubricant conditioning. It is a process in which used old oil is partially drained & new fresh oil is filled to top up the level.

→ This process is applicable where it is assumed that there is no oxidation, thermal & hydrolytic degradation of base oil & further the oil is not contaminated with those contaminants which cannot be separated.

(iii) Restructuring Additive system :-

It is Known as reclamation. In this, lubricant is reblended with additive system. To reblend proper additive in base oil, heat & mechanical stirring is required. The quality of lubricating oil can be improved effectively in this way.

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6.4.2. Lubricant Disposal

If the lubricant in the machine is not taken care of properly & its quality has deteriorated to such an extent that it cannot be used further, then it should be disposed off from the machine.

→ Since used oil is hazardous, so it should be disposed off as per rules & regulations.

6.5.1 Lubrication needed for bearings

Bearings are used to bear the load. The working of all rotating machines depend upon the condition of bearings.

→ When bearings are assembled, proper clearance is provided so that required amount of lubricant may

remain in the clearance space.

→ For effective working of bearings, it is essential that bearings are lubricated after determined time period with right quality and quantity of lubricant.

→ If during inspection, any abnormality is found in the working of bearings, then in that case, the machine should be stopped to find out the faults in the working.

→ The selection of lubricants for bearings must be carried out carefully so that the bearings may work safely in full range of operating temperatures.

→ When grease is used in the bearings, it should be kept in mind to remove the old grease before inserting new grease.

→ The bearings which are not to be used must be kept in suitable containers.

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6.5.2 Lubrication needed for gears

The lubricating oils needed for lubricating gears must be of high grade & quality & must be within the range of recommended viscosity.

→ The oils must be anti-corrosive & must not possess foaming properties.

→ The lubricants used for gear drives must be protected from moisture, dust & chemical fumes so as to protect quality of lubricants.

6.5.3 Lubrication needed for chains

The lubricants must be checked for quality before use. If the chain drive is working in open atmosphere, then grease applied on chains should be replaced after certain time interval so as to minimize the quantity of foreign particles b/w two mating surfaces.

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6.6. Purpose & Procedure of changing lubricating oils periodically

6.6.1 Purpose of changing Lubricating Oils

If the oils are changed periodically, then maintenance decreases & the m/c works effectively. If the oils are not changed for a long time, the qualities of lubricating oils deteriorate & breakdown of machine may occur.
Hence the instructions regarding quality / grade of the lubricating oils and time interval for the change of lubricating oils should be followed properly.

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6.6.2 Procedure for changing Lubricating Oils

Before starting any machine, its lubricating oil level must be checked with dip-stick.

→ If the level of lubricating oil is below the minimum mark, then fresh lubricating oil must be added so that the level may come above the minimum mark.

→ If it is not done, then the engine parts will not be lubricated properly which will be harmful for engine parts.

→ If the level is above the maximum mark, it is also harmful to engine because in this case, the oil may enter the combustion chamber & carbon products will be produced in excess.