

TOPIC 5: VISCOSITY

Prescribed content

Viscosity

- Define viscosity as the property of the fluid to oppose relative motion between the two adjacent layers.
- Discuss the effect of temperature on viscosity in the field of technology.
- Discuss motor oil viscosity grades.

Mind map

- Liquid flow (viscosity)
- Effect of temperature on viscosity in the field of Technology
- Grading of oil according to SAE
- Engine lubricant
- Oils function
- Stoke's law

📌 The definition of viscosity is the property of the fluid to oppose relative motion between the two adjacent layers

📌 Liquid flow

Laminar flow

Occurs when a fluid flows in parallel layers, with no disruption between the layers (video on you tube)

Turbulent flow

Is a flow regime in fluid dynamics characterized by chaotic changes in pressure and flow velocity

📌 Effects of temperature on viscosity in the field of technology

✓ Grade 10 Mechanical technology week 7-8, 8 hours, topic maintenance and generics properties of lubricants

- high boiling point and low freezing point
- high viscosity index
- demulsibility
- corrosion prevention
- thermal stability
- high resistance to oxidation
- hydraulic stability

📌 Grading of oil according to SAE

SAE- Society of Automotive Engineers

Oils can be separated into multigrade oil and monograde oils

Monograde oils: only suitable to be used in winter time because they are oils which are good for cold starting eg. 5w,10w,15w 20w

Multigrade oils:fulfil two viscosity specifications ie. 10W40, 10W for low temperature viscosity winter, 40W high temperature for summer.

**Stroke's law**

When a spherical object, move through a viscous liquid there is a viscous drag force upon it

$$F_{\text{drag}} = 6\pi r\eta v$$

$$\pi\text{-pie } \frac{22}{7}$$

r- radius of sphere

η - viscosity

v- velocity of sphere

Important terms/definitions

Viscosity	the property of the fluid to oppose relative motion between the two adjacent layers.
Laminar flow	occurs when a fluid flows in parallel layers, with no disruption between the layers (video on you tube)
Turbulent flow	is a flow regime in fluid dynamics characterized by chaotic changes in pressure and flow velocity.
Lubricant	is a compound used to decrease the friction between two surfaces by separating them from one another with a film of oil

QUESTIONS

- 1.1 Which one of the following is NOT a cause of excessive wear in machinery?
 - A too much pressure between moving parts
 - B lubrication
 - C overheat
 - D ceasing

2. Wear and tear is caused by the generation of heat when materials with rough surface are rubbed over each other. To solve this problem technologists investigated the circumstances and invented lubricants and coolants.
 - 2.1 Name two functions of lubricants
 - 2.2 Explain the term viscosity.
 - 2.3 Explain how the monograde and multigrade oils function?
 - 2.4 Explain two methods of lubricants in a four stroke engine?
 - 2.5 Explain how the two stroke engine is lubricated.

ANSWERS

- 1.1 B
- 2.1 -to reduce friction
-to reduce overheating due to friction
- 2.2 -viscosity is the property of the fluid to oppose the relative motion between two adjacent layers
- 2.3 -monograde oil : only suitable for one session use.
-multigrade oil: suitable for both sessions use.
- 2.4 -pressure feed system
-full force feed system
- 2.5 -in the two stroke petrol engine the petrol is mixed with oil which assists in the lubrication of the valves and rockers
-the crank shaft bearing cap has a scoop which scoops the oil from the sump and splashes the oil unto all moving parts in the sump ed. the crankshaft and bearings