



SNS COLLEGE OF TECHNOLOGY

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COIMBATORE-35.



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DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB204 – AUTOMOTIVE ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR / IV SEMESTER

Unit 1 – Electrical Systems

Topic : Headlight and Sidelight





HEADLIGHT



- ❖ Headlights are the primary illumination source for vehicles, providing forward visibility during nighttime driving and in low-visibility conditions such as fog, rain, or snow.
- ❖ There are typically two types of headlights:
 - **Halogen Headlights:** Traditional headlights that use halogen bulbs, providing a yellowish-white light.
 - **LED or Xenon Headlights:** Modern headlights that use LED (Light Emitting Diode) or Xenon (High-Intensity Discharge, HID) bulbs, offering brighter and whiter light with lower energy consumption.



HEADLIGHT



- ❖ Headlights emit focused beams of light in specific patterns to illuminate the road ahead.
- ❖ The two common beam patterns are:
 - **Low Beam:** Designed to illuminate the road ahead without blinding oncoming drivers.
 - **High Beam:** Provides maximum illumination for long-distance visibility but must be used responsibly to avoid blinding other drivers.
- ❖ Headlights should be properly aligned and adjusted to ensure optimal illumination without causing glare or visibility issues for other drivers.



SIDELIGHT



- ❖ Sidelights serve as auxiliary lighting to enhance the visibility of the vehicle, especially when parked or during low-light conditions such as dusk or dawn.
- ❖ They also improve the vehicle's visibility to other drivers from the side.
- ❖ Sidelights are typically located at the front and rear corners of the vehicle, near the headlights and taillights.
- ❖ Sidelights emit a dim, steady light, usually in amber or white color.
- ❖ They are not as bright as headlights and are primarily for visibility rather than illumination.



SIDELIGHT



- ❖ Sidelights are subject to regulations regarding their color, intensity, and when they should be used.
- ❖ In some regions, they may be required to be illuminated when the vehicle is parked in certain conditions.
- ❖ Sidelights are often used in conjunction with other exterior lights, such as headlights or taillights, to enhance the vehicle's visibility, especially in low-light conditions where full headlights may not be necessary.



COMPONENTS OF HEAD LIGHT



- ❖ **Bulb/Bulb Holder:** This is the light source itself. Common types include halogen, HID (High-Intensity Discharge), and LED bulbs.
- ❖ **Reflector:** This is a mirrored surface that surrounds the bulb and reflects the light forward. It helps to focus and distribute the light effectively onto the road ahead.
- ❖ **Lens/Cover:** The lens covers the front of the headlight assembly and protects the bulb and reflector from damage. It also helps to shape the light beam and can have features like prisms or textures to scatter or direct light in specific ways.
- ❖ **Housing/Body:** This is the main structural component of the headlight assembly, holding all the other parts together and providing protection from the elements.



COMPONENTS OF HEAD LIGHT



- ❖ **Adjustment Screws:** These allow for the adjustment of the headlight's aim, ensuring proper alignment for optimal visibility without blinding other drivers.
- ❖ **Wiring Harness and Connectors:** These components provide electrical connections between the bulb and the vehicle's electrical system, allowing for power to be supplied to the bulb.
- ❖ **Ballast (in HID systems):** HID bulbs require a ballast to regulate the voltage and current supplied to the bulb. This ensures proper operation and longevity of the HID bulb.



COMPONENTS OF HEAD LIGHT



- ❖ **Heat Sink (in LED systems):** LED bulbs generate heat during operation, so a heat sink is often incorporated into the headlight assembly to dissipate this heat and prevent damage to the bulb and surrounding components.



LED LIGHTING SYSTEM



- ❖ LED bulbs are semiconductors that emit light when an electrical current passes through them.
- ❖ Compared to traditional bulbs, LEDs are more energy-efficient, have a longer lifespan, and produce a brighter and more focused light output.
- ❖ LED headlights are becoming standard in many modern vehicles.
- ❖ They provide brighter and whiter light, improving visibility for the driver and enhancing safety.
- ❖ LED headlights also consume less power than traditional halogen or HID headlights, which can help improve fuel efficiency in vehicles.



LED LIGHTING SYSTEM



- ❖ Many vehicles feature LED DRLs integrated into the front bumper or headlight assembly.
- ❖ DRLs increase the visibility of the vehicle during daylight hours, reducing the risk of accidents.
- ❖ LED DRLs are energy-efficient and durable, making them ideal for this application.
- ❖ LED technology is also commonly used in tail lights and brake lights.
- ❖ LED tail lights illuminate more quickly than traditional incandescent bulbs, which can provide valuable reaction time for drivers behind the vehicle.
- ❖ Additionally, LED brake lights can be programmed to emit a brighter light when the brakes are applied, further enhancing safety.



LED LIGHTING SYSTEM



- ❖ LED turn signals offer several advantages, including faster response times and improved visibility.
- ❖ Some LED turn signals are designed with dynamic or sequential lighting patterns, which can enhance the vehicle's appearance and make the turn signals more noticeable to other road users.
- ❖ LEDs are also used for interior lighting in automobiles, including dome lights, map lights, and ambient lighting.
- ❖ LED interior lights consume less power and produce less heat than traditional incandescent bulbs, making them more efficient and comfortable for passengers.



HEAD LIGHT DAZZLING AND PREVENTIVE METHODS



- ❖ Headlight dazzling, also known as glare, occurs when the bright lights from an oncoming vehicle's headlights impair the vision of the driver, causing discomfort and potentially increasing the risk of accidents.
- ❖ Ensure that your vehicle's headlights are correctly aligned.
- ❖ Misaligned headlights can emit light at incorrect angles, increasing the likelihood of glare for oncoming drivers.
- ❖ If you suspect your headlights are misaligned, have them adjusted by a professional.



HEAD LIGHT DAZZLING AND PREVENTIVE METHODS



- ❖ When driving at night or in low-visibility conditions, use low beam headlights rather than high beams.
- ❖ Low beams illuminate the road ahead without causing excessive glare for other drivers. Reserve high beams for use on unlit roads with no oncoming traffic.
- ❖ Some modern vehicles are equipped with automatic high beam control systems that can detect oncoming vehicles and adjust the headlights accordingly.
- ❖ These systems automatically switch between high and low beams to minimize glare for other drivers while maintaining optimal visibility for the driver.



THANK YOU !!!