Date: 01/08/2025

Lab Practical #02:

Study of different network devices in detail.

Practical Assignment #02:

1. Give difference between below network devices.
   - Hub and Switch
   - Switch and Router
2. Working of below network devices:
   - Repeater
   - Modem((DSL and ADSL)
   - Hub
   - Bridge
   - Switch
   - Router
   - Gateway

Hub and Switch

No.	Hub	Switch
1	Operates at Layer 1 (Physical)	Operates at Layer 2 (Data Link)
2	Broadcasts data to all ports	Forwards data to specific ports
3	No MAC address learning	Learns and stores MAC addresses
4	Less efficient, causes collisions	More efficient, no collisions
5	Half-duplex communication	Full-duplex communication

Switch and Router

No.	Switch	Router
1	Operates at Layer 2 (Data Link)	Operates at Layer 3 (Network)
2	Uses MAC addresses for routing	Uses IP addresses for routing
3	Connects devices in a LAN	Connects multiple networks
4	Does not provide NAT or DHCP	Provides NAT, DHCP, and firewall
5	Faster for local traffic	Slower due to complex routing

Router and Gateway

No.	Router	Gateway
1	Routes data between networks	Connects different protocols
2	Uses IP addresses	Translates between protocols

Date: 01/08/2025

3	Operates at Layer 3	Can operate at multiple layers
4	Typically, hardware-based	Can be hardware or software
5	Focuses on packet forwarding	Focuses on protocol conversion

Working of below network devices:

1. **Repeater**
   - A repeater regenerates and amplifies weak signals to extend the range of a network. It operates at the Physical Layer (Layer 1) and does not filter or interpret data.
2. **Modem (DSL and ADSL)**
   - A modem modulates digital data into analog signals for transmission over telephone lines (DSL) and demodulates incoming analog signals back into digital data. ADSL (Asymmetric DSL) provides faster download speeds than upload speeds.
3. **Hub**
   - A hub is a basic networking device that connects multiple devices in a LAN. It broadcasts incoming data to all connected devices, operating at the Physical Layer (Layer 1).
4. **Bridge**
   - A bridge connects two LAN segments and filters traffic based on MAC addresses. It operates at the Data Link Layer (Layer 2) to reduce collisions by dividing collision domains.
5. **Switch**
   - A switch connects devices in a LAN and forwards data to specific ports based on MAC addresses. It operates at the Data Link Layer (Layer 2) and improves network efficiency by reducing collisions.
6. **Router**
   - A router connects multiple networks and routes data packets based on IP addresses. It operates at the Network Layer (Layer 3) and provides features like NAT, DHCP, and firewall.
7. **Gateway**
   - A gateway connects networks with different protocols or architectures. It translates data between incompatible systems and can operate at multiple layers of the OSI model.