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

Hub and Switch

No.	Hub	Switch
1	Broadcasts data to all connected devices, regardless of the destination.	Sends data only to the specific device it is intended for, using MAC addresses.
2	Slower, usually **10 Mbps or 100 Mbps**.	Faster, supports **10/100/1000 Mbps** (Gigabit Ethernet Cable).
3	Dumb device no knowledge of network structure.	Smart device learns MAC addresses and builds a table.
4	Cheaper.	Slightly more expensive but more cost-effective long-term.
5	Legacy or small home networks	Modern LANs, offices, and data centres.

Switch and Router

No.	Switch	Router
1	Connects devices within the same network (LAN)	Connects multiple networks together (e.g., LAN to Internet)
2	Works at Data Link Layer (Layer 2)	Works at Network Layer (Layer 3)
3	High-speed data transfer within local network	Slightly slower due to routing tasks
4	Does not assign IP address	Can assign IPs via DHCP
5	LANs, office networks	Internet access, connecting LANs

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Router and Gateway

No.	Router	Gateway
1	Routes data between similar networks (e.g., LAN to WAN)	Connects and translates data between different network systems
2	Operates mainly at Layer 3	Can operate at all layers
3	Simpler, focused on IP routing	More complex.
4	Home/office networks, internet access	Enterprise systems, different architectures (e.g., IoT to cloud)
5	Home Wi-Fi router	VoIP gateway, email gateway, cloud API gateway

Working of below network devices:

1. Switch
   - Switches are used to connect devices within the same network or local area network (LAN). If you need to connect devices from different networks, you would typically use a router or a layer 3 switch, which can route traffic between different networks

2. Router
   - Routers connect computers and other devices to the Internet. A router acts as a dispatcher, choosing the best route for your information to travel. It connects your business to the world, protects information from security threats, and can even decide which computers get priority over others.

3. Gateway
   - The gateway receives data from devices within the network. After receiving data, the gateway intercept and analyse data packets, which include analysing packet header, payload etc..

4. Repeater
   - A repeater is an electronic device used in data communication networks to receive a signal, amplify or regenerate it, and retransmit it.

5. Hub
   - A hub is a basic networking device that connects multiple computers or other network devices in a Local Area Network (LAN).

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6. Bridge
   - A bridge is a device used to connect and filter traffic between two or more network segments, making them function as a single network. It helps to reduce traffic, improve performance, and segment a network logically.

7. Modem
   - A **modem** is a device that **converts digital data** from a computer into **analog signals** for transmission over telephone lines or other analog systems—and vice versa.