ISHub AAU Summer Bootcamp – Networking Track Answers

**Section 1: Network Cables & Connectors**

1. STP vs. UTP:

STP (Shielded Twisted Pair): Shielding to prevent EMI.

UTP (Unshielded Twisted Pair): No shielding, cheaper and common.

Differences: STP has shielding and higher cost; UTP is flexible and widely used.

2. STP Advantages & Disadvantages:

Advantages: Better interference protection, better in noisy areas.

Disadvantages: More expensive, harder to install.

3. Coaxial Cable:

Definition: Has a central conductor, insulation, shielding, and outer jacket.

Uses: Cable TV, legacy Ethernet.

4. BNC Connector:

Used to connect coaxial cables in CCTV and older Ethernet setups.

5. RJ45 vs. RJ11:

RJ45: 8 pins, used for networking.

RJ11: 4/6 pins, used for telephone lines.

6. Cat5e and Cat6:

Cat5e: Up to 1 Gbps, 100m.

Cat6: Up to 10 Gbps (55m), 1 Gbps (100m).

7. Types of Fiber Optic Cables:

Single-mode: Long-distance, laser light, small core.

Multi-mode: Short-distance, LED light, larger core.

8. Single-mode vs. Multi-mode:

Single-mode: Long range, costly, high bandwidth.

Multi-mode: Short range, cheaper, lower bandwidth.

9. Fiber vs. Copper Advantages:

1. Higher speed.

2. Less interference.

10. T568A and T568B Color Codes:

T568A:

1. White/Green

2. Green

3. White/Orange

4. Blue

5. White/Blue

6. Orange

7. White/Brown

8. Brown

T568B:

1. White/Orange

2. Orange

3. White/Green

4. Blue

5. White/Blue

6. Green

7. White/Brown

8. Brown

11. Straight-through Cable Uses:

- PC to Switch

- Router to Switch

12. Crossover Cable Use:

- PC to PC

- Switch to Switch

13. Tools:

Crimping tool

Cable tester

14. Fill in the blanks:

Straight-through: PC to Switch

Crossover: PC to PC

15. Cable Comparison:

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Cost | Speed | Interference |
| Coaxial | Med | Moderate | Moderate |
| Twisted Pair | Low | High | High |
| Fiber Optic | High | Very High | Very Low |

**Section 2: Communication Models**

16. Communication Model: Defines data transmission between devices.

17. Data Flow Types:

- Simplex: One-way (e.g., TV)

- Half-Duplex: Two-way, but one at a time (e.g., walkie-talkie)

- Full-Duplex: Two-way simultaneously (e.g., phone)

18. Simplex vs. Half vs. Full Duplex:

|  |  |
| --- | --- |
| Type | Example |
| Simplex | Keyboard |
| Half-Duplex | Walkie-talkie |
| Full-Duplex | Phone call |

19. Protocol Importance:

Ensures devices understand each other.

20. Communication System Elements:

**Sender, Receiver, Message, Medium, Protocol**

**Section 3: OSI Model**

21. OSI Layers (Top to Bottom):

1. Application

2. Presentation

3. Session

4. Transport

5. Network

6. Data Link

7. Physical

22. OSI Layer Protocols:

- Application – HTTP, STP,HTTPS

- Transport – TCP, UDP

- Network – IP

- Data Link – Ethernet

- Physical – Fiber Optic Cable

23. Transport Layer:

- Ensures reliable delivery. Protocols: TCP, UDP

24. IP Addressing:

- Occurs at Layer 3 (Network)

- Used for logical addressing and routing.

25. Data Units:

- Layer 4: Segment

- Layer 3: Packet

- Layer 2: Frame

- Layer 1: Bits

26. Devices:

|  |  |
| --- | --- |
| Device | Layer |
| Router | Layer 3 |
| Switch | Layer 2 |
| Hub | Layer 1 |

27. OSI File Sending Process:

Each layer adds headers or formatting to help transmit the file successfully.

28. Importance of OSI Model:

- Helps with troubleshooting and understanding network flow.

29. Real-life Analogy:

- Like a postal system: write letter (Application) to delivery (Physical).

30. BONUS: OSI vs. TCP/IP

- OSI: 7 layers, separates Presentation and Session.

- TCP/IP: 4 layers, combines upper layers.

- Similarity: Both are layered models.