Activity Sheet:

A. Slow Learners

Activity 1: Protocol Identification Table

Problem: Fill in the table below by identifying whether the following statements relate to TCP or UDP.

Statement	TCP/UDP
Connection-oriented	
Suitable for video streaming	
Has error-checking and correction	
No handshake before communication	
Reliable Transmission	

Solution:

Statement	TCP/UDP
Connection-oriented	**TCP**
Suitable for video streaming	**UDP**
Has error-checking and correction	**TCP**
No handshake before communication	**UDP**
Reliable Transmission	**TCP**

Activity 2: Port Number Classification

Problem: Match the service with its default port number.

Service	Port Number
HTTP	

DNS	
FTP	
SMTP	
Telnet	
DHCP	

Solution:

Service	Port Number
HTTP	**80**
DNS	**53**
FTP	**20/21**
SMTP	**25**
Telnet	**23**
DHCP	**67/68**

B. Moderate Learners

Activity 1: Address Type

Problem: Match the address types with their correct definitions.

Address Type	Specification
I. IP Address	**A.** Uniquely identifies a service running on a host
II. Port Address	**B**. Combines an IP address and a port number
III. Socket Address	**C**. Uniquely identifies a host on a network (logical address)
IV. MAC Address	**D**. Hardware address that uniquely identifies a device on a LAN

Solution:

I → C, II → A, III → B, IV → D

Activity 2: Analyzing Socket Addresses

Problem: Given the following socket addresses, identify and fill in the corresponding:

- IP Address
- Port Number
- Protocol

Socket Address	IP Address	Port Number	Name of Protocol
192.168.1.5:80			
10.0.0.10:53			
172.16.0.2:443			
192.168.100.1:25			
203.0.113.10:67			

Solution:

Socket Address	IP Address	Port Number	Name of Protocol
192.168.1.5:80	192.168.1.5	80	HTTP
10.0.0.10:53	10.0.0.10	53	DNS
172.16.0.2:443	172.16.0.2	443	HTTPS
192.168.100.1:25	192.168.100.1	25	SMTP
203.0.113.10:67	203.0.113.10	67	DHCP

C. Fast Learners

Activity 1: TCP Header Analysis

Problem: A TCP segment is captured with the following hexadecimal header (first 20 bytes only):

0050 1F90 00000001 00000000 5002 7210 A1B2 C3D4

IIdentify the following fields:

1. What are the source port number and destination port number?
2. What is the sequence number?
3. What is the acknowledgment number?
4. What is the window size?

Solution:

★ Each pair of hex digits = 1 byte.

★ TCP Header format:
[**Source Port (2B), Dest Port (2B), Seq Num (4B), Ack Num (4B)**, Data Offset + Flags (2B), **Window Size (2B)**, Checksum (2B), Urgent Pointer (2B)]

1. **0050 → Source Port → 0x0050 = 80**
2. **1F90 → Dest Port → 0x1F90 = 8080**
3. **00000001 → Sequence Number → 1**
4. **00000000 → Acknowledgment Number → 0**
5. **7210 → Window Size = 0x7210 = 29200**

Activity 2: TCP Congestion Control
Problem: Suppose that the TCP congestion window is set to 18 KB, and a timeout occurs. What will the window size be if the next four transmission bursts are all successful? Assume that 1 MSS is to be 1 KB.
Solution:
At Timeout:

- Setting the slow start threshold (ssthresh) to **half** of the current congestion window size.
- Set the congestion window size to 1 MSS.
- Resuming the **slow start phase**.

So now,
Slow start threshold (ssthresh) = 18 MSS / 2 = 9 MSS
Congestion window size (cwnd) = 1 MSS
Slow Start Phase begins:-

1. Window size at the start of the 1st transmission = 1 MSS
2. Window size at the start of the 2nd transmission = 2 MSS
3. Window size at the start of the 3rd transmission = 4 MSS
4. Window size at the start of the 4th transmission = 8 MSS
5. Window size at the start of the 5th transmission = 9 MSS

After 4 successful transmissions, the window size will be 9 MSS or 9 KB.