Assignment Questions IV

Subject :- Computer Network

1. **What is the size of the TCP header ? What are the different fields ? Describe its fields.**

The size of a TCP (Transmission Control Protocol) header is typically 20 bytes, but it can be larger if options are included. The TCP header is structured with various fields that provide essential information for the transmission of data. Here are the fields in a standard TCP header:

TCP Header Fields:

1. **Source Port (16 bits)**:
   - The port number of the application on the sender's side.
2. **Destination Port (16 bits)**:
   - The port number of the application on the receiver's side.
3. **Sequence Number (32 bits)**:
   - Indicates the sequence number of the first byte of data in this segment. If the SYN flag is set, this field contains the initial sequence number.

4. **Acknowledgment Number (32 bits)**:
   ○ If the ACK flag is set, this field contains the value of the next sequence number that the sender of the segment is expecting to receive.

5. **Data Offset (4 bits)**:
   ○ Indicates the size of the TCP header in 32-bit words. This tells where the data begins.

6. **Reserved (3 bits)**:
   ○ Reserved for future use and should be set to zero.

7. **Flags (9 bits)**:
   ○ Contains control flags that manage the state of the connection. Common flags include:
     ■ **URG**: Urgent pointer field significant
     ■ **ACK**: Acknowledgment field significant
     ■ **PSH**: Push Function
     ■ **RST**: Reset the connection
     ■ **SYN**: Synchronize sequence numbers (used during the connection establishment)
     ■ **FIN**: No more data from the sender (used to close the connection)

8. **Window Size (16 bits)**:
   ○ The size of the sender's receive window (buffer space) indicates how much data the sender can accept.

9. **Checksum (16 bits)**:
   ○ A checksum for error-checking the header and data to ensure data integrity.

10. **Urgent Pointer (16 bits)**:
    ○ If the URG flag is set, this field indicates the offset from the sequence number that signifies urgent data.

11. **Options (variable length)**:
    ○ This field is optional and can include various TCP options, such as Maximum Segment Size (MSS), Window Scale Factor, and others. The size of this field can vary, and if it is present, the header size increases beyond the standard 20 bytes.

12. **Padding (variable length)**:
    ○ Used to ensure the header is a multiple of 32 bits, which may include extra bits for alignment.