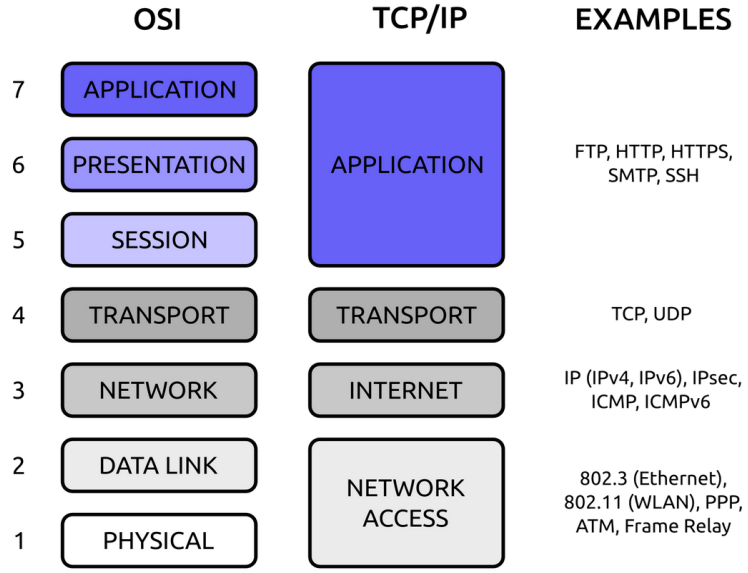
Computer Networks
2nd Year, 1st Semester

Tutorial 5 – Sample Answers

1. Explain the TCP/IP model corresponds with the layers of OSI model. Use a diagram. Show the protocols running on each TCP/IP layers.



2. An HLEN value of decimal 12 means,
   i. What is the header length in bytes?
   12 * 4 ➔ 48 Bytes

   ii. What is the length of 'options' field?
   Header size – standard header size
   48 – 20 ➔ 28 Bytes

3. What is the value of the total length field if the header is 28 Bytes and data field 400Bytes?
   Total Length = Data size + Header size
   400 + 28 ➔ 428 Bytes

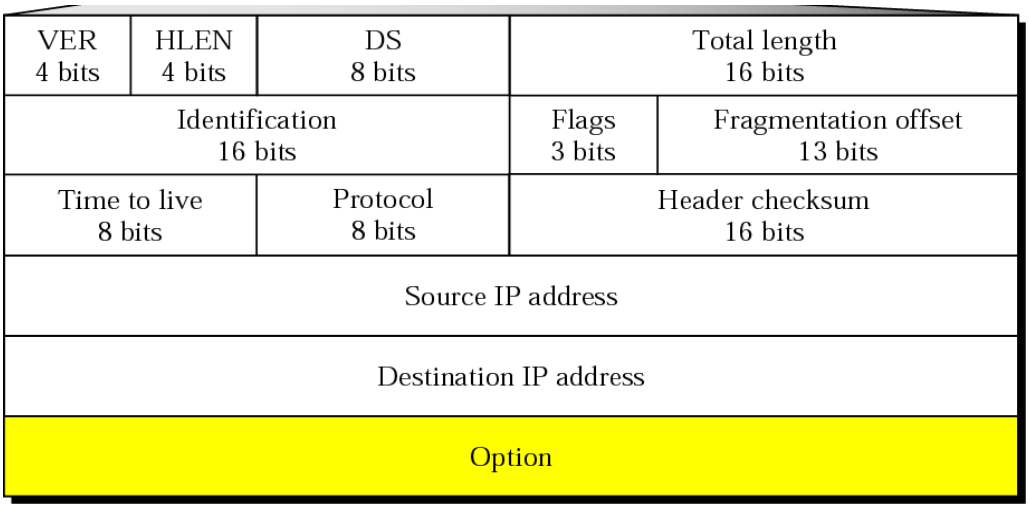
4. What is the length of the data field when HLEN value 14 and total length value of 40000?
   Header size = 14 * 4 ➔ 56
   Data size = total Length - Header size ➔ 40000-56 ➔ 39944 Bytes

5. Which fields of the IP header change from router to router?
   - Time to live
   - Header checksum

6. Calculate the HLEN value if the total length is 1200 Bytes, 1176 of which is data from the upper layers.
   Header Length = 1200 – 1176 ➔ 24bytes
   HLEN = 24/4 ➔ 6

7. Can the value of the header length be less than 20? When is it exactly 20?
   NO , the value of the header length CANNOT be less than 20
   It is exactly 20 when there are no option fields

8. An IP datagram has arrived with the following information in the header (in hexadecimal):
   45 00 00 54 00 03 00 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02



4 – Version – IPv4
5 – HLEN – 5*4 → 20Bytes → No option fields → Only standard fields
00 – DS – Normal Service
00 54 –Total Length → $(54)_{16}$ ➔ $(84)_{10}$ → 84bytes ➔ 84-20 → 64 Data Bytes
00 03 - Identification# → 3
00 00 – Flags and offset → 000 0 0000 0000 0000 → D=0 , M=0 , Offset = 0
20 - TTL – $(20)_{16}$ → 32 Routers
06 - Protocol - TCP
00 00 – Header checksum → No Errors
7C 4E 03 02 – Source IP address ➔ 124.78.3.2
B4 0E 0F 02 - Destination IP address ➔ 180.14.15.2

i. Are there any options?
   NO

ii. Is the packet fragmented?
   NO
   M=0 , Offset = 0 , Data size (64 bytes) is lesser than MTU (1500)

iii. What is the size of the data?
   64 Bytes

iv. How many more routers can the packet travel to?
   32 Routers

v. What is the identification number of the packet?
   3

vi. What is the type of Service?
   Normal service

9. A datagram is fragmented into three smaller datagrams / fragments. Which of the following is true?
    a) The *do not fragment* bit is set to 1 for all three datagrams.
    b) The *more fragment* bit is set to 0 for all three datagrams.
    c) The identification field is the same for all three datagrams.
    d) The offset field is the same for all three datagrams.
    e) None of the above.

10. If the fragmentation offset has a value of 100 (in decimal), it means that _____.
    a) The datagram has not been fragmented.
    b) The datagram is 100 Bytes in size.
    c) The first byte of the datagram is byte 100.
    d) The first byte of the datagram is byte 800.

11. The checksum in the IP packet covers _____
    a) Just the header
    b) Just the data
    c) The header and the data
    d) Just the source and the destination addresses