5) The various duties of nlw layers are:- Explain each of them.
i) Nlw layer are responsible for end to end delivery of packets.
ii) Segments are encapsulated.
iii) Provides logical addressing that routers use for path determination
iv. Determines best path for packet forwarding
v. Fragmentation is performed.

6. Differentiate between forwarding and routing? ~~Explain each of them~~ What are the various services that can be provided to the flow of packets between a given source and destination?

⇒ Routing refers to the nlw-wide process that determines end-to-end paths that packets take from source to destination whereas, forwarding on the other hand, can be considered as a process of getting through a single intersection.

The services are:-
i) Connectionless Packet switching
ii) Connection-Oriented Packet switching

i) Connectionless Packet-switching
Each packet in this switching includes source address, destination address & total number of packet & sequence number for reassembly. In the process packets are individually routed. Also known as datagram switching.

ii) connection-Oriented packet switching
Also known as virtual circuit switching, data packets are first assembled and then numbered. They then travel

travel across a predefined routes, sequentially. Address info-rmation is not needed in circuit switching, because all packet are sent in sequence

7. List the current IP address classes. Explain about each of them

⇒ The current IP address classes are:-

a) class A

This IP address class is used to when there are a large no of hosts. In a class A type of n/w the first 8 bit identifies the n/w, and the remaining have 24 bit for the host in th that n/w.

class A addresses : 127.0.0.0 to 127.255.255.255 cannot be used and is reserved for loopback & diagnostic function.

Ip range 0 to 127 ~~with subnet~~ 0.0.0.0 to 126.255.255.254 (127.0.0.0)

b) Class B

In a B class IP address, the binary address start with 10. In this IP address, the class decimal number that can be between 128 to 191. The no 127 is reserved for loopback, which is used for internal testing on the local machine.

This range: 128.0.0.0 - 191.255.~~255.254~~ (0.0)

c) class c

class c is a type of IP address that is used for the small n/w. In this class, three octets are used to indent the n/w.

IP range: 192.0.0.0 - 223.255.254.~~255~~ 0.

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d) class D

class D addresses are only used for multicasting application. Class D never used for regular n/w operations. This class address the first three bits set to "1" & their fourth bit set to use for "0". It is 32-bit n/w addressed.

IP range - 244.0.0.0 - 223.255.255.0

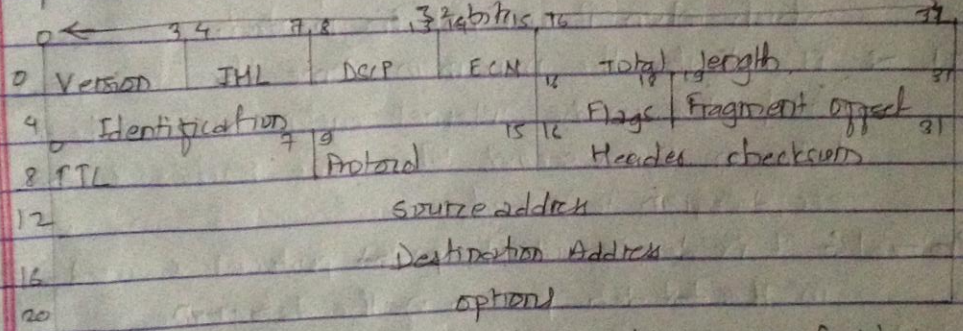
e) class E.

class E addresses are used reserved for future use, or research & development purposes. It is defined by including the starting 4 n/w address bits as 1.

IP range - ~~224~~ 240.0.0.0 - 255.255.255.255.

5. Explain about IPv4 header format.

→



An IPv4 packet header has a total of 14 fields.

→ Version: It is first field contain 4-bit. In the case of IPv4 the value of its four bits is set to 0110, which indicates 4 in binary

→ IHL - known as Internet Header length. It is of 4 bit in size. It is used to specify the size of the header to avoid any error.

→ Service & DSCP provide features related to the service quality. It is used to specific how a datagram will be handled.

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→ ECN :- Explicit Congestion Notification is used to send notification to the sender or receive in situation where n/w congestion happens.

→ Total length : It is used to denote the size of entire datagram. Minimum size of IP datagram is 16 bytes. maximum can be 65,535 bytes.

→ Identification : This fields helps to identify IP datagram fragmented uniquely.

→ Flags : Flag are of 3 bit field used to control & identify fragments. Its configuration, Bit 0, reserved & has to be set to zero, Bit 1 - DF we do not fragment, Bit 2 - more fragment (MF).

→ Fragment offset : It is used to specify the offset of a fragment relative to the start of the IP datagram, which when it was not fragmented.

→ TTL :- It indicate the maximum time the datagram will be live in the internet system. TTL can be in between 0-255 second. When value reaches 0 from 255, datagram is erased.

→ Protocol :- It is denote which protocol is used in the data portion of the datagram.

→ Checksum : It is used to check the header for any error. The header is compared to the value of the value of its checksum at each hop & in case the header checksum is not matching. the packet is discarded.

→ source address : It indicate source address.

→ Destination address : It indicates receivers address.

→ Options : It is only used when the value of IHL is set to more than 5. We can add security in it. Record route

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& time stamp etc.

9. How is subnet mask is used to find the nlw address? explain with ~~explain~~ example

⇒ Subnet mask specifies the nlw part & host part of any IP address. The 1's in a subnet mask define nlw part & 0's ~~in a~~ define host part.

e.g. 192.168.9.0

It is IP address of class C. It's subnet would be 255.255.255.0 which 24 bit is nlw part & 8 bits is host part. If we increase the host ie we need to borrow the bits from nlw part. Suppose we increase the host by 1 then we need to increase/borrow 4 bits from nlw part. And its subnet will be 192.168.9.0/20.

10. What is the role of routing table? Explain about its structure.

⇒ Routing table is set of rules, often viewed in table format, that is used to determine where data packet travelling over an IP nlw will be directed. Routing table is show below:-

Destination	Subnet mask	Interface
128.75.43.0	255.255.255.0	Eth0
128.75.43.0	255.255.255.128	Eth1
192.12.17.5	255.255.255.255	Eth3
default.		Eth2

In the table above, the destination IP packets are delivered along with subnet mask & interface which is being used to connect to the destination IP.