1.

a) Before you can start to talk, the physical circuit needs to be set up. Initial delay is due to physical circuit establishment required before any information can be sent.

b) Both Virtual Circuit and Datagram are Packet Switching network services. So they have most of the advantages and disadvantages of packet switching over circuit switching and those are common to both of them. Other than that they have certain advantage and disadvantage specific to them and those are mentioned in 1.b) ii), iii) and c) ii), iii). The questions has asked advantage and disadvantages specific to these approaches (VC or datagram), though I have given credit to any reasonable answer.

i) In Virtual Circuit, at connection establishment time, path from source to destination is selected and used throughout connection lifetime. All packets carry the virtual circuit number in the header. All intermediate routers from source to destination keep a table with VC number and outgoing interface entry. Thus all packets follow the same path assuming no failures.

ii) Since all packets follow the same path, they reach destination in order.

iii) There is an initial set-up delay. If intermediate router/link fails then virtual circuit needs to be established again.

c) i) In datagram networks, each packet is routed independently. Therefore, depending on the traffic condition, successive packets may follow different routes. If a particular link fails or becomes congested due to heavy traffic, packets will be
forwarded using an alternate path (if exists) towards destination.

ii) Since different packets may follow different path they might reach the destination out of order. If the application needs to receive data in the same order it was sent, the receiver side will have to order the datagrams first before passing them to the upper layer.

iii) Datagram switching has very small set-up delay. Adapts to changing traffic condition or topology changes quickly by forwarding packets in alternate path towards destination.

d) Internet is an example of datagram networks. Since, in datagram network, all the packets are forwarded independently, they might follow different path depending on the traffic condition and as a result arrive at the receiver out of order. This may result in different datagrams experiencing different delays to get to the destination which is problematic in delivering real-time video.

2.

a) “Store-and-forward” is a routing feature where the receiving interface receives the entire incoming packet and stores in memory inside the router. This is needed so the router can look up the datagram's destination address in its routing table before forwarding it onto the next hop.

b) This is another routing feature where after receiving a packet, the router looks up the routing table for the next hop and then forwards the packet towards the next hop.

c) Every router/switch maintains a routing table which lists the destination and the corresponding next hop information to reach that destination. In case of VC network, instead of destination address router keeps VC numbers.
3. 
   a) Routing and forwarding are functions typically performed by Routers/Switches.
   
   b) The telephone network is an example of circuit-switching network, while the Internet is an example of a packet-switching network.
   
   c) Datagrams are formed by the header and the payload.
   
   d) The interconnection of two or more networks is called a(n) internetwork or internet.

4. 
   a) 
   
<table>
<thead>
<tr>
<th>Destination</th>
<th>Next Hop</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Interface 4</td>
</tr>
<tr>
<td>B</td>
<td>Interface 4</td>
</tr>
<tr>
<td>C</td>
<td>Interface 4</td>
</tr>
<tr>
<td>D</td>
<td>Interface 5</td>
</tr>
<tr>
<td>E</td>
<td>Interface 8</td>
</tr>
</tbody>
</table>

   b) The route that will be followed is: 1,1 -> 1,5 -> 3,1 -> 3,5