1. (10 points) (a) For the network shown below, give the VCI translation (forwarding) tables for all the switches after each of the following connections is established. Assume that the sequence of connections is cumulative; that is, the first connection is still up when the second connection is established, and so on. Also assume that the VCI assignment always picks the lowest unused VCI on each link, starting with 0.
   (i) Host A connects to host G
   (ii) Host C connects to host H
   (iii) Host E connects to host I
   (iv) Host D connects to host B
   (v) Host F connects to host I
   (vi) Host H connects to host A

(b) Suppose the VCI translation tables for each switch in the above network are as shown below. Connections are bidirectional. List all endpoint-to-endpoint connections.

2. (20 points) Consider following network:
   a. Suppose that routing information is exchanged using link state routing protocol and the
3. (10 points) As networks become a critical infrastructure that many businesses depend on, reliability is an important consideration in today's networks. To ensure reliability in the face of link failure, one solution is to establish a back-up path between two nodes in addition to a primary path (e.g., the shortest path). This back-up path should not share any link with the primary path, i.e., they are disjoint.
   
   a. Suppose that the nodes in a network (with any arbitrary topology) exchange routing information using a link state routing protocol. Design a simple heuristic algorithm that will find two disjoint paths from a given source node to any destination node. You need to argue that your algorithm is correct, i.e., the two paths your algorithm finds are indeed disjoint.
   
   b. Suppose the nodes use a distance vector routing protocol to exchange routing information. Is it possible to find two disjoint paths from a given source to any destination node? Briefly explain your answer.

4. (10 points) A router has the following (CIDR) entries in its routing table:

<table>
<thead>
<tr>
<th>Address/mask</th>
<th>Next hop</th>
</tr>
</thead>
<tbody>
<tr>
<td>135.46.56.0/22</td>
<td>Interface 0</td>
</tr>
<tr>
<td>135.46.60.0/22</td>
<td>Interface 1</td>
</tr>
<tr>
<td>192.53.40.0/23</td>
<td>Router 1</td>
</tr>
<tr>
<td>default</td>
<td>Router 2</td>
</tr>
</tbody>
</table>
For each of the following IP address, what does the router do if packets with the following addresses arrives?

(a) 135.46.63.10
(b) 135.46.57.14
(c) 135.46.52.2
(d) 192.53.40.7
(e) 192.53.56.7