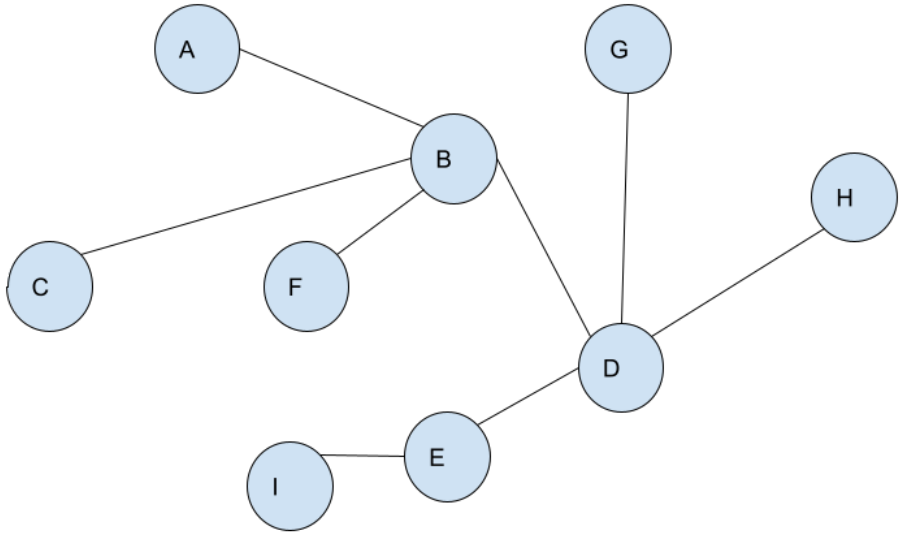
1. What is the main difference between Pure Aloha and Slotted Aloha? Are there any circumstances where Pure Aloha would perform better than Slotted Aloha? If so, give such circumstances/conditions. If not, explain why Pure Aloha could never perform better than Slotted Aloha.

In pure ALOHA, whenever a station has data to send it transmits it without waiting whereas, in slotted ALOHA a user waits till the next time slot begins to transmit the data. In pure ALOHA the time is continuous whereas, in Slotted ALOHA the time is discrete and divided into slots.

2.



3. This double encryption is not more secure than single encryption method. A simple substitution cipher is a one-to-one mapping into the same space, and the composition of any two such mappings is still a one-to-one mapping, and again into the same space.
4. Consider the bit string 00101101010100001111111010011101 and the key 10011. Use the key to encrypt and then decrypt the string using bit level ciphering.

Plaintext: 00101101010100001111111010011101
Encryption key 10011100111001110011100111001 1
Cipher text 10110001101101111100010011111 0
Decryption key 10011100111001110011100111001 1
Plain text 00101101010100001111111010011101

5. Suppose you were trying to crack an encryption method that used a 64-bit key. Assuming a brute force attack, how many keys per second must you try to crack the code in 30 days?
   Total encryption 2^64
   30 days = 2.592e+6
   2^64 / 2.592e+6 = 7.1167994e+12
6. Multiple downstreams channels and upstream channels. FDM over upstream, downstream frequency channels. TDM upstream: some slots assigned, some have contention downstream MAP frame: assigns upstream slots request for upstream slots (and data) transmitted random access (binary backoff) in selected slots.
7. Since all devices are connected together, full-mesh topology has higher levels of redundancy. If one path fails, there is always an alternative path. There are multiple paths available in full-mesh topology. Data can be transmitted simultaneously. Any maintenance work in the network will not cause any disturbance for the devices in full-mesh topology. However, Implementation cost of full-mesh topology is very high. As the number of devices in the network increases, the complexity of the network will increase. Fully connected topology not only alleviates the host-to-host capacity limitations but also allows communication between hosts in any two racks, not connected to the same switch, to be logically equivalent, irrespective of their location in the data center.
8. A. 15 bits in total. 4 parity bits

   P1 even parity for 1,3,5,7,9,11

   P2 even parity for 2,3,6,7,10,11

   P3 event parity for 4,5,6,7,12

   P4 event parity for 8,9,10,11,12

   B. 24 bits in total. 5 parity bits.

   P1 even parity for 1,3,5,7,9,11,13,15,17,19,21,23

   P2 even parity for 2,3,6,7,10,11,14,15,18,19,22,23

P3 event parity for 4,5,6,7,12,13,14,15,20,22,23

P4 event parity for 8,9,10,11,12,13,14,15,21,24

P5 event party for 16,17,18,19,20,21,22,23,24

9. Token may be damaged due to noise and may be lost if the device that has it crashed. In switched Ethernet, the hub connecting the stations of the classic Ethernet is replaced by a switch. The switch connects the high-speed backplane bus to all the stations in the LAN. The switch-box contains a number of ports, typically within the range of 4 – 48. A station can be connected in the network by simply plugging a connector to any of the ports. Connections from a backbone Ethernet switch can go to computers, peripherals or other Ethernet switches and Ethernet hubs. In switched Ethernet, collisions do not occur in the channel due to the presence of dedicated connection to each station. However, collisions may still occur in a destination port if it receives frames from more than one ports simultaneously. In a switch, each port has its own individual collision domain and resolves it individually.