1) Define the attributes of a partial mesh and a full mesh Frame Relay Network

2) Explain the Purpose of Inverse ARP, as well as how it uses Frame Relay broadcasts

3) What is the name of the Field that identifies, or addresses a Frame Relay virtual circuit?

4) Mention 2 advantages of Frame Relay versus leased line type of connectivity for an enterprise environment.

5) Imagine that 2 Cisco routers R1 and R2 use FR for connectivity between them. R1 connects to a switch that uses LMI type ITU Q.933a and R2 connects to a switch that uses LMI type ANSI T1.617. What can R1 and R2 configure for the LMIs to work correctly?

6) Which of the following commands are required on the router connected to a DTE cable to make the serial link between two routers work when the 2 routers are connected using a DTE and DCE cable and no CSU DSUs?

    a) clockrate 56000
    b) clock rate 56000
    c) bandwidth 56000

d) band width 56000
e) none of the above

7) Define NAT and explain the basics of its operation. Include NAT overload.

8) Define the term outside local address in relation to NAT.

9) What ICMP message code(s) does the trace command rely on?
   a. Can't Fragment
   b. Subnet Unreachable
   c. Host Unreachable
   d. Time to Live Exceeded

10) Which of the following summarized subnets are valid routes according to the main purpose of CIDR?

   a. 211.111.0.0 255.255.0.0
   b. 211.111.111.0 255.255.255.0
   c. 188.0.0.0 255.255.255.0
   d. 188.88.0.0 255.0.0.0
   e. none

11) What is the smallest summarized route that summarizes the subnets 155.33.133.0, 155.33.134.0, 155.33.140.0, and 155.33.141.0, all with mask 255.255.255.0?

12) Of the routing protocols RIPv-1, EIGRP, OSPF & IGRP, which are classful?

13) Of the routing protocols RIPv-1, EIGRP, OSPF & IGRP, which support VLSM?

14) Of the routing protocols RIPv-1, EIGRP, OSPF & IGRP, which do not advertise the mask information along with subnet numbers?

15) What is the difference between classless and classful routing?

16) What allows for the successful use of a discontiguous Class A,B or C IP network?—classful routing, classful routing protocol, classless routing, or classless routing protocol.

17) What is the smallest summarized route that summarizes the subnets 110.5.105.16, 110.5.105.32, and 110.5.105.48, all with mask 255.255.255.252?

18) Explain the concept and application of Administrative Distance.

19) What is the difference between VLSM and CIDR?

20) Which of the following subnets is not a valid summary that includes subnet 110.1.55.0 110.1.56.0 and 110.1.57.0, mask 255.255.255.0?

a. 110.0.0.0 255.0.0.0
b. 110.1.0.0 255.255.0.0
c. 110.1.52.0 255.255.255.0
d. 110.1.48.0 255.255.240.0
e. 110.1.32.0 255.255.224.0

21) List the distance vector loop-avoidance features used by OSPF, such as split horizon.

22) List 2 OSPF features that help decrease the size of OSPF topology database.

23) Compare and contrast the type of information exchanged in routing updates sent by distance vector routing protocols versus link-state protocols.

24) Explain the use of Redistribution and list at least 2 critical factors to be considering while doing this process.

25) If the command router **ospf 1**, followed by **network 192.224.0.0 0.7.255.255 area 0**, with no other network commands, is configured in a router that has an Ethernet0 interface with IP address 192.232.1.1, does OSPF send updates out Ethernet0? (assume a neighbor has being discovered on such interface) Explain why or why not.

26) Which of the following routing updates will actually make it to the final routing table? Briefly explain why. (3 points)

R 10.0.0.0/27 via Serial 0
C 20.0.0.0/24 directly connected
O 10.0.0.0/27 via Serial 2
S 30.0.0.0/24 via Serial 1
30.0.0.0/24 via Serial 2 (IGRP)
D 20.0.0.0/24 via Serial 4
O E2 10.0.0.0/24 via Eth 0
D 10.0.0.0/24 via Serial 3
D 20.0.0.0/27 via Serial 3
S 20.0.0.0/24 via Eth 1

27) Can we obtain successful network connectivity if our routers are using RIPv1 and our subnets came from a single Class B network and all of them have a mask /29? Why or why not?

28) Given the IP address 167.88.99.66 and the mask 255.255.192.0, what is the broadcast address?

29) Given the IP address 190.1.42.3 and the mask 255.224.0.0, what are the assignable IP addresses in this subnet?

30) What is the valid IP range if you change the mask to the previous to a /21?

31) You design a network for a customer who wants the same subnet mask on every subnet. The customer will use a network 10.0.0.0 and needs 1228 subnets, each with 18 hosts maximum. What subnet mask would you use to allow the most growth in subnets? Which mask would work and would allow for the most growth in the number of hosts per subnet?

32) What are the **valid subnets** that can be obtained form the IP range assuming default class mask for each of them? 180.137.189.0 /13?

33) List all the **subnets** that would allow 50 users each, which can be created, from the following IP range: 150.150.164.0 /22

34) Explain how a switch in VTP transparent mode treats VTP messages received from a VTP server.

35) Explain the steps to configure SSH access to a switch?

36) What is the function of the command "neighbor" in OSPF? When would you use it?

37) Must all members of the same VLAN be in the same collision domain, the same broadcast domain, or both?

38) Explain the use of DR and BDR on OSPF, also how a DR is selected.

39) Explain the advantages and disadvantages of STP

40) List and explain the 4 different port states on a switch while running STP

41) List and explain the different switching methods supported by a "switch"

42) How does the root bridge is selected on STP if no configuration is done by the network administrator?

43) Describe how a switch decides whether it should forward a frame, and tell how it chooses the output interface.

44) (**2 points**) Write the Ipv6 address that a computer would create assuming it has a mac address of 01:19:DB:28:CE:38?

45)What does MPLS stands for? Tell me 3 uses of it.

46) Tell me the similarities between FR and MPLS

47)Does MPLS has to forward data based on routing table? Why of why not?

48)Does each router in the MPLS cloud checks destination IP? Explain.

49)Tell me 2 drawbacks of overlay networks

50)Tell me 3 reasons why IPSec is useful

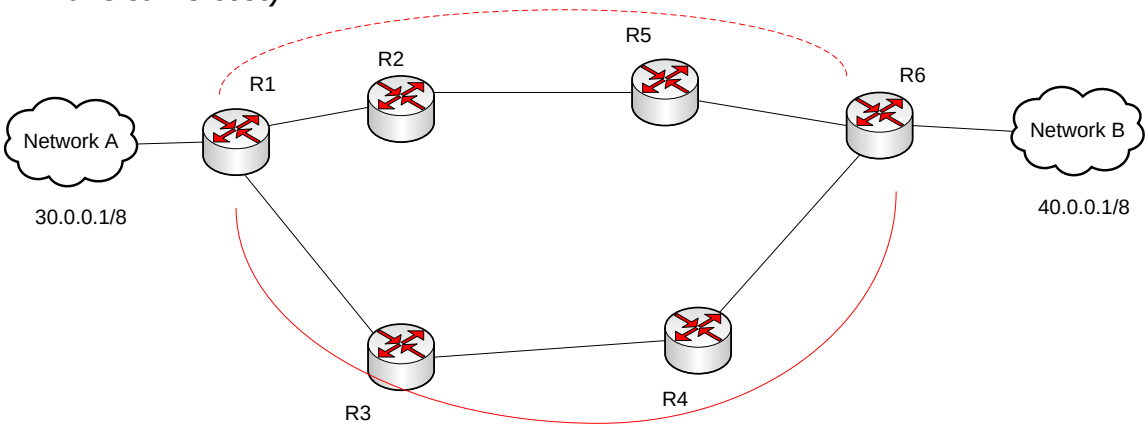
51)What is IPSec and how does it work? What is the difference between transport mode and tunnel mode?

52)What is the value of concepts such as authentication and data integrity while establishing IPSec Tunnels?

53)On which layer does MPLS works?

54)Are LSP's full duplex or half duplex? Explain.

55) **(10 points max)** Explain MPLS operation with respect to the following diagram and the involvement of the following terms: (Assume all the links have same cost)




a) IGP Routing selection and purpose
b) Label Switched Path
c) Label Switching Routers
d) Ingress Router
e) Transit Router
f) Penultimate Router
g) Egress Router
h) Label Distribution Protocol
i) Forward Equivalence Class
j) Resource Reservation Protocol

60) **(5 points)** Show how data is encapsulated (use diagram), consider that you are encrypting a credit card number, which is fed into a website (port 80). Show all headers/trailers involved from layer 7 to layer 2 (assume Ethernet at layer 2, and tunnel mode encryption)

61) **(5 points)** Show how to create a NAT pool, and how to use it in a router with 3 ports, one on the private subnet 20.20.20.0/24 one on the private subnet of 30.30.30.192/26 and another on the public network 120.120.120.0/24, assume you have 10 public IP addresses to use. NAT pool should only be used by SIP (port 5060)

62) **(10 points)** Explain how an IPSec session is established between 3 peers. Explain the function/involvement of each of the following components:

a) ESP
b) AH
c) ISAKMP
d) Diffie-Hellman
e) Transform Set
f) IKE Phase 1
g) IKE Phase 2
h) ACLs
i) Message Authentication codes
j) Encryption algorithm
k) Pre-shared Keys
l) Tunnel Timeout
m) Crypto map