1-) What is the difference between ARP and RARP?
ARP will resolve the MAC address of a device for which we know the IP address.
RARP will resolve the IP address of the device for which we know the MAC address.

2-) ARP is:
a-) A layer 3 protocol that is used by layer 3
b-) A layer 2 protocol that is used by layer 2
c-) A layer 3 protocol that is used by layer 2
d-) A layer 2 protocol that is used by layer 3
e-) A layer 2 protocol that is used by layer 1
f-) A layer 1 protocol that is used by layer 2
g-) A layer 1 protocol that is used by layer 1

3-) Why do IP addresses have to be unique on the internet?
Because routers depend on the destination IP address to forward traffic, thus it needs to be unique to be able to route it, otherwise the router will not know which destination the packet should go to.

4-) Two sub layers of OSI Data Link layer are which of the following? [Select 2].
A. Logical Link Control
B. Data Link Control
C. Media Access Control
D. Physical Layer Control

5-) You want to verify the encapsulation type being used at Data Link layer for interface eth0. Which command can you use?
A. sh ip protocol
B. sh int eth0
C. sh ip interface
D. sh processes
6-) Consider the following network setup:
Assume that initially all ARP and routing tables are empty and none of the PCs or Router is configured to do forwarding.

PC 1 is configured with the following commands:
ifconfig eth0 10.0.1.11 netmask 255.255.255.0 gw 10.0.1.14

PC 2 is configured with the following commands:
ifconfig eth0 10.0.1.12 netmask 255.255.255.0 gw 10.0.1.14
ifconfig eth1 10.0.1.12 netmask 255.255.255.0
ifconfig eth0 down

PC 3 is configured with the following commands:
ifconfig eth0 10.0.2.13 netmask 255.255.255.0 gw 10.0.2.14
ifconfig eth1 10.0.3.13 netmask 255.255.255.0

Router1 is configured with the following commands:
Router1 #config terminal
Router1 (config)#interface ethernet0/0
Router1 (config-if)# ip address 10.0.1.14 255.255.255.0
Router1 (config-if)# no shutdown
Router1 (config-if)# #interface ethernet0/1
Router1 (config-if)# ip address 10.0.2.14 255.255.255.0
Router1 (config-if)# no shutdown
Router1 (config-if)# exit
Router1 (config)#ip routing
i) Can PC1 ping PC2 with the command “ping 10.0.1.12”? If yes state the sequence of operation, if no state why?

No, because interface eth0 with this IP address on PC2 is down.

ii) Can PC1 ping PC2 with the command “ping 10.0.3.12”? If yes state the sequence of operation, if no state why?

No, because the router has no static entry for the network 10.0.3.0 and eth0 on PC2 is down and PC2 is not forwarding.

iii) Can PC1 ping PC3 with the command “ping 10.0.3.13”? If yes state the sequence of operation, if no state why?

No, because the router has no static entry for the network 10.0.3.0 and PC3 is not forwarding.

iv) Can PC1 ping PC3 with the command “ping 10.0.2.13”? If yes state the sequence of operation, if no state why?

Yes. PC1 issues an ARP request for the MAC address of the gw (10.0.1.14), Router1 replies to ARP with its MAC address. PC1 sends ICMP echo request to (10.0.2.13). Router1 receives ICMP echo request and does ARP for (10.0.2.13), PC2 answers with its MAC address. Router1 forwards ICMP request to PC2. PC2 replies with ICMP echo reply to Router1 after resolving its MAC address. Router1 forwards ICMP echo reply to PC1 after resolving its MAC address.

v) Can PC2 ping PC3 with the command “ping 10.0.3.12”? If yes state the sequence of operation, if no state why?

Yes, because they are directly connected and on same subnet. PC2 issues ARP request for 10.0.2.13. PC3 answers the ARP request. PC 2 sends the ICMP echo request. PC3 issues ARP request for 10.0.3.12 and PC2 replies with its MAC address. PC3 sends ICMP echo reply to 10.0.3.12 thus completing the ping.
Assume now that the following commands are executed:

PC 1 is configured with the following commands:
ifconfig eth0 10.0.1.11 netmask 255.255.255.0 gw 10.0.1.12

PC 2 is configured with the following commands:
ifconfig eth0 up

PC 3 is configured with the following commands:
echo”1” > /proc/sys/net/ipv4/ip_forward

Router1 is configured with the following commands:
Router1 #config terminal
Router1 (config)#ip route 10.0.3.0 255.255.255.0 10.0.2.13

v) Can PC1 now ping PC2 with the command “ping 10.0.3.12”? If yes state the sequence of steps that happen. If not, is it possible to change the configuration of Router 1 only, to make PC1 ping PC2 with the command “ping 10.0.3.12”?

No, you have to enable forwarding on PC 2.