Section A – There are 40 questions in total, each worth 2 marks. Answer all questions.

Select one correct answer for each question. All responses in this section should be marked in pencil on the supplied OMR sheet.

Q1. Which of the following statements is FALSE?

(A) Many Internet giants are using Linux to host their servers due to its stability and reliability.
(B) Linux can be customized to meet the needs of the target customers.
(C) The need for anti-virus in Linux is relatively low.
(D) Among all Linux distributions, Ubuntu is the best for all due to its high popularity and large community.
(E) Android is a type of a Linux distribution.

(2 marks)

Q2. During the installation process of Linux OS, if you encounter an error message as shown below, what might have happened to cause this error?
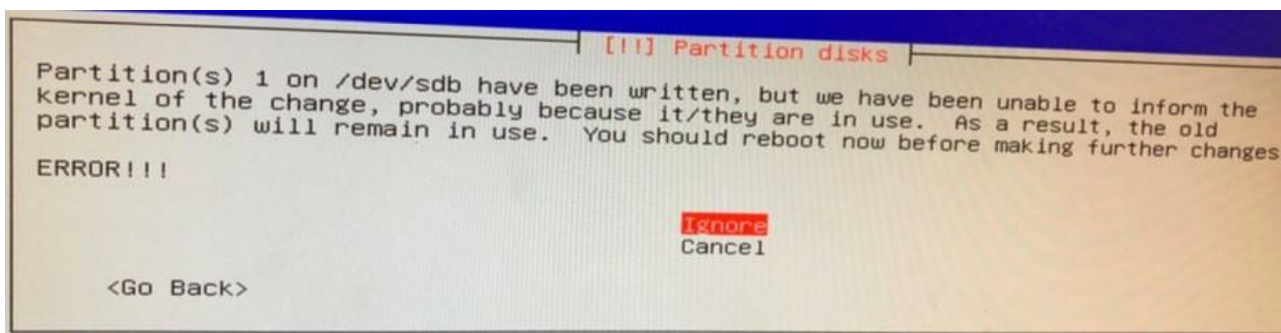
(A) The system cannot identify a network connection for the installation to proceed.
(B) A wrong mirror has been selected previously for the installation package.
(C) The installation file or disk has been damaged therefore the installation cannot continue.
(D) The specified partition (**/dev/sdb** in this case) does not exist.
(E) There is not enough storage space for the installation to go through.

(2 marks)

Q3. Which one of the following can be regarded as a computer system that needs to have an OS installed?

(A) Mobile phone
(B) Robot vacuum cleaner
(C) Smart TV
(D) Raspberry Pi
(E) All the above

(2 marks)

Q4. Assuming you just logged onto a Linux OS as a user named mike, after typing ls you discover there is a sub-directory called Music. Which command below will NOT allow you to enter the Music directory?

(A) cd /home/mike/Music
(B) cd Music/
(C) cd ./Music/
(D) cd /Music
(E) cd ~/Music

(2 marks)

Q5. When starting up a machine, which key can be used to change the boot order?

(A) Up arrow key
(B) F7
(C) F12
(D) Exit
(E) Ctrl

(2 marks)

Q6. Based on the information shown in the figure below, which command will close the ping process?

```
[Xianhuis-MacBook:~ XianhuiChe$ jobs
[1]+  Stopped                 ping google.com
[Xianhuis-MacBook:~ XianhuiChe$ ps
  PID TTY           TIME CMD
 7386 ttys000    0:00.03 -bash
 7461 ttys000    0:00.01 ping google.com
```

(A) kill 1
(B) kill %1
(C) stop 1
(D) stop 7461
(E) kill 7386

(2 marks)

Q7. What does the command **ls -al > listing** do?

(A) List all the files of the current directory and display them on the screen
(B) Search a file called listing within the current directory
(C) Move all files to the directory called listing
(D) Write the list of all files within the current directory to a file called listing
(E) None of the above

(2 marks)

Q8. Which file in Linux contains configuration details of network interface cards?

(A) /sys/network
(B) /sys/network/interfaces
(C) /etc/network/interfaces
(D) /etc/interfaces
(E) /sys/interfaces

(2 marks)

Q9. What is the objective of TCP flow control?

(A) To avoid congesting the central network.
(B) To detect traffic loss and congestion.
(C) To avoid overloading the sender.
(D) To avoid overloading the receiver.
(E) To adjust the congestion dynamically.

(2 marks)

Q10. Which command below can list all users?

(A) cat /etc/passwd
(B) more /etc/users
(C) cat /users
(D) more /usr
(E) cat /etc/group

(2 marks)

Q11. Based on the information shown in the figure below, which of the following statement is TRUE?

```
-rw-r--r--    1 xc15aad   staff      7 12 Nov 13:15 mydir2
```

(A) mydir2 is a directory that the user xc15aad created.
(B) User xc15aad can execute mydir2.
(C) Everybody has the permission to read mydir2.
(D) Members in the staff group can edit mydir2.
(E) It is no longer possible to change permissions for mydir2.

(2 marks)

Q12. Assuming there is a file called file1 in the current working directory. The command ls -l has given out rwxr-xr-x information for this file. If you wish to stop others (i.e. the rest of the world) from executing file1 whilst keeping all the remaining permissions intact, which command will you use?

(A) chmod o-x file1
(B) chmod o+x file1
(C) chmod o=rw- file1
(D) chmod o=--- file1
(E) chmod o-r-- file1

(2 marks)

Q13. Which command can be used to change ownership of a file?

(A) ch
(B) chusr
(C) chmod
(D) chgrp
(E) chown

(2 marks)

Q14. Where can you find information about the available shells in the current Linux OS you are using?

(A) /echo/shells
(B) /env/shells
(C) /etc/shells
(D) /sys/shells
(E) /shells

(2 marks)

Q15. What result will you expect to see after typing df -h command in Linux terminal window?

(A) Format disk with added information of headers
(B) Format disk with the option to halt the system in the end
(C) Display all file systems and their disk usage sorted by highest usage first
(D) Display all file systems and their disk usage in human-readable format
(E) None of the above

(2 marks)

Q16. Which command will NOT assign an IP address to eth0 (assuming they all work in their contexts)?

(A) dhclient eth0
(B) ifup eth0
(C) ifconfig eth0 192.168.1.1
(D) ifconfig eth0 up

(E) All the above commands will assign a certain IP address to eth0

(2 marks)

Q17. Which configuration information will DHCP server assign to its clients?

(A) IP address
(B) Subnet mask
(C) DNS server address
(D) Gateway address
(E) All the above

(2 marks)

Q18. Where can you find the DNS server information of your current Linux OS?

(A) /etc/network/interfaces
(B) /etc/resolv.conf
(C) /interfaces/resolv.conf
(D) /etc/network/resolv.conf
(E) /etc/network

(2 marks)

Q19. If you type ping herts.ac.uk in the CLI, what information will you NOT get from the response?

(A) The IP address of the herts.ac.uk server
(B) The transition time for each ICMP packet
(C) The sequence number of each ICMP packet
(D) The size of each packet that has been sent out
(E) The IP address of intermediate nodes

(2 marks)

Q20. Which network command below can display the current network connection information in a Linux operating system?

(A) ifconfig -a
(B) tracer
(C) netstat
(D) nslookup
(E) route print

(2 marks)

Q21. Which layer of the OSI model is involved in congestion control and flow control?

(A) 6
(B) 5
(C) 4
(D) 3
(E) 2

(2 marks)

Q22. Which of the following elements may be considered as metrics for routing protocols to decide the best path of data delivery?

(A) Network delay
(B) Number of hops
(C) Link bandwidth
(D) Link utilisation
(E) All of above is possible

(2 marks)

Q23. Which protocol below work outside autonomous systems?

(A) RIP
(B) OSPF
(C) BGP
(D) EIGRP
(E) IGP

(2 marks)

Q24. Which statement below is FALSE regarding the TTL field of an IP packet?

(A) It is decrementing every time being processed.
(B) Packets are dropped when the value is 0.
(C) Used to prevent dead loop circulation of packets.
(D) Identifies the latency of packet delivery.
(E) It is within the header field of the IP packet.

(2 marks)

Q25. Which class does the IP address 190.23.2.70 belong to in a classful network definition?

(A) A
(B) B
(C) C
(D) D
(E) E

(2 marks)

Q26. Determine whether the devices below are in the same subnet:

A: 172.16.30.10/20
B: 172.16.31.30/20
C: 172.16.32.15/20

(A) They are all in the same subnet.
(B) They are in the same subnet except A.

(C) They are in the same subnet except B.
(D) They are in the same subnet except C.
(E) They are all in different subnets.

(2 marks)

Q27. Which one of the following is NOT a valid IPv6 address?

(A) ::
(B) 1080::8::417A
(C) ::12.1.68.1
(D) FFFF::200C
(E) 8::

(2 marks)

Q28. A company has purchased a class B address 173.15.0.0. Assuming the number of hosts is unknown, please advise a subnet mask to accommodate 7 subnets in a network?

(A) 255.255.128.0
(B) 255.255.192.0
(C) 255.255.224.0
(D) 255.255.240.0
(E) 255.255.248.0

(2 marks)

Q29. Which IP address below can be used to identify a workstation in a private network?

(A) 10.200.10.1
(B) 127.0.0.1
(C) 172.10.2.3
(D) 193.168.0.1
(E) 255.0.0.0

(2 marks)

Q30. An organization is expanding its network but finds that the current addressing scheme cannot support any more workstations. Which solution below can be attempted if it has not been tried yet?

(A) Reconfigure gateway
(B) Re-wiring the network
(C) Renegotiate with DHCP server
(D) Upgrade routers
(E) Use NAT

(2 marks)

Q31. Which communication approach below is used between DHCP server and client?

(A) Unicast
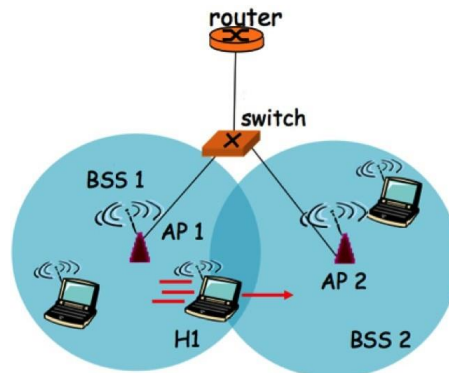(B) Broadcast
(C) Multicast
(D) Semi-cast
(E) Both unicast and multicast

Q32. Assuming your laptop is equipped with only one network card, which is a WiFi module, if you move the laptop from the library to the lab, which statement is true for your laptop?

(A) Both MAC address and IP address might have changed.
(B) Both MAC address and IP address remain the same.
(C) Your MAC address remains the same, and your IP address might have changed.
(D) Your MAC address might have changed, and your IP address remains the same.
(E) Both MAC and IP address will be unknown.

Q33. In the network architecture as shown in the figure below, when laptop H1 moves from BSS1 to BSS2, which statement below is TRUE?

(A) H1 remains the Internet connection via relaying data from AP2 to AP1.
(B) The switch remembers the port to reach H1.
(C) BSS stands for Broadcast Service Set.
(D) This is an ad hoc network architecture.
(E) The MAC address of H1 will be reallocated.

Q34. Which cable will you use for the main trunk link of a bus-topology network?

(A) Twisted pair
(B) Coaxial cable
(C) Wireless link
(D) Shielded twisted pair
(E) Unshielded twisted pair

Q35. IP provides best effort data delivery service. Which of the following statements does NOT imply what 'best effort' means here?

(A) The service IP provides is unreliable.
(B) IP does not establish connection between source node and destination node.
(C) IP guarantees the delay for data delivery would be minimum.
(D) IP datagram may be delivered out-of-sequence.
(E) Higher layer protocols have to deal with losses or/and duplicate packets.

(2 marks)

Q36. What is the length of IPv6 address?

(A) 32 bits
(B) 48 bits
(C) 64 bits
(D) 128 bits
(E) 256 bits

(2 marks)

Q37. Which one of the following functions is NOT typically offered by a WiFi router?

(A) Option to close the broadcasting so that the WiFi network is invisible to others
(B) Assign a DHCP address pool
(C) Configure a key to join the WiFi network
(D) Change the external IP address of the WiFi router
(E) Choose encryption options from WEP, WPA, WPA2, etc

(2 marks)

Q38. Which protocol below translates IP addresses into MAC addresses?

(A) RIP
(B) ARP
(C) DNS
(D) RAP
(E) RARP

(2 marks)

Q39. Which OSI layer does FTP work at?

(A) 7
(B) 6
(C) 5
(D) 4
(E) 3

(2 marks)

Q40. Which one of the following terms names the Ethernet technology with the speed of 1 Gbps?

(A) 1BaseT
(B) 10BaseT
(C) 100BaseT
(D) 1000BaseT
(E) 1BaseF

(2 marks)

Section B – **There are 4 questions in total, each worth 5 marks. Answer all questions.**

Q1. The size of a typical webpage is about 50kb. Surveys have shown that internet users will start to lose interests if the web page is not displayed after 10 seconds; and after 20 seconds if the page is still not displayed properly, most users will give up and close the page connection. Comment on the ETE delay standard for maintaining an acceptable service and a best service respectively.

(5 marks)

Q2. With the help of diagram, illustrate and explain the packet encapsulation process during a web-browsing activity.

(5 marks)

Q3. In a small social sensing network that consists of three members (A, B, and C), A spends 1 hour with B and 1 hour with C; B spends 3 hours with C. Calculate the weight of each communication link as shown in the network below.
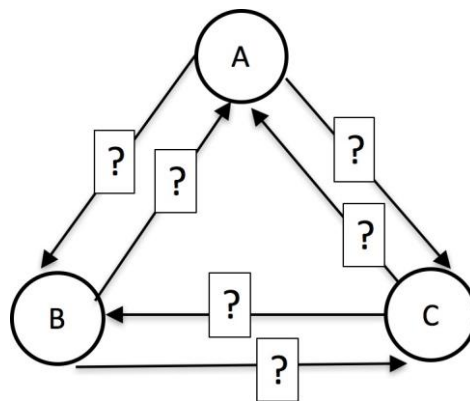
(5 marks)

Q4. Give two real-life examples of IoT, and explain how they fit the IoT model description.

(5 marks)