G.C.E. (A/L) Examination – March 2020

Information & Communication Technology (ICT)

Conducted by Field Work Center (FWC), Thondaimanaru

In Collaboration with the Northern Provincial Education

தகவல் தொடர்பாடல் தொழினுட்பவியல் I, II Information & Communication Technology I, II	Three hours Gr. 12 (2021)	20	E	I,II

Instructions: Part I

- Answer all questions
- Write down your index number on the space provided.
- In each of the questions 1 to 40, pick one of the alternatives (1),(2),(3),(4),(5) which is correct or most appropriate. Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.
- No use of calculators.

1. 36_{10} =

(1) 100001_2 (2) 110100_2 (3) 111011_2 (4) 110010_2 (5) 100100_2

2. Who introduced the idea of controlling designs in weaving machines by using punch cards?

(1) Blaise Pascal
(2) Herman Hollerith
(3) Charles Babbage
(4) Joseph Jacquard
(5) John Von Neumann

3. 6.25_{10} =

(1) 110.01_2 (2) 110.10_2 (3) 111.01_2 (4) 111.10_2 (5) 101.01_2

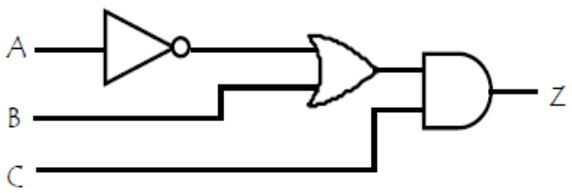
4. Which of the following(s) is/are equivalent to Boolean expression $(\bar{x} + y)(x + \bar{y})$?

A – $xy + \bar{x}\,\bar{y}$
B – $x \oplus y$
C – $\overline{x \oplus y}$

(1) A only (2) B only (3) C only (4) A,B only (5) A,C only

5. What is the output Z of the following combined gates?

(1) $\bar{A} + BC$
(2) $\bar{A}B + C$
(3) $\bar{A}C + B$
(4) $C.(\bar{A} + B)$
(5) $\bar{A}BC$



[See page no. 2

6. The fastest storage unit built in inside the microprocessor is …….

(1) Cache memory
(2) Hard disk
(3) Control unit
(4) Main memory
(5) Register

7. The Equivalent of CAF_{16} is/are.

A - 128_{10}
B - 110010101111_2
C - 6257_8

(1) A only (2) B only (3) A,B only (4) B,C only (5) A,B,C all

8. Which of the following statement does correctly describe World Wide Web (www)?

(1) A set of interlinked hypertext documents accessible via the Internet
(2) A set of web pages
(3) A set of interlinked web pages accessible via any network
(4) A system of documents that is accessible by using http protocol
(5) The Internet is an another name for the World Wide Web

9. Which of the following is a valid IP address?

(1) 192.4.3 (2) 192.4.3.256 (3) 3.5.6.3.8 (4) 5.4.3.9 (5) 257.4.3.5

10. In computer networks, how many layers are there in TCP/IP network reference model?

(1) 7 (2) 5 (3) 4 (4) 8 (5) 6

11. Consider the followings.

A - Digital signature
B - Phishing
C - Firewall
D - Encryption

Which of the above is/are the threats against computer system?

(1) A only (2) B only (3) A,C only (4) A,B only (5) C,D only

12. The two's complements of (10_{10}) and (-8_{10}) are respectively.

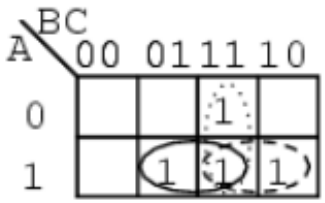
(1) 10101111_2 , 10101111_2
(2) 10001111_2 , 10001111_2
(3) 00001001_2 , 11111000_2
(4) 00001010_2 , 11111000_2
(5) 11111111_2 , 11100010_2

[See page no. 3

13. The encryption technique in which the same key is used for encryption and decryption is called.

(1) Symmetric encryption
(2) Asymmetric encryption
(3) Public key encryption
(4) Special key encryption
(5) Hybrid encryption

14. Consider the following Karnaugh map.



Which of the following Boolean expression that represents segment of the groups given in this map?

(1) $AB + BC + AC$ (2) ABC (3) $\bar{A}BC + A\bar{B}$ (4) $AB + \bar{B}C$ (5) $\bar{A}\bar{C} + BC$

15. Consider the following Boolean expression.

$(A + \bar{B})(\overline{A + C})$

Which of the following is equivalent to the Boolean expression given in above?

(1) $(\overline{ABC})$ (2) $A + \bar{B} + C$ (3) $(\overline{A + B + C})$ (4) $A + B + \bar{C}$ (5) $AB + \bar{C}$

16. Which of the following group consists of only the unguided media among the media used in data communication and computer networks?

(1) Infrared ray, fiber optics cable, radio wave
(2) Co-axial cable, microwave, radio wave
(3) Infrared ray, microwave, twisted pair cable
(4) Infrared ray, microwave, radio wave
(5) Twisted pair cable, fiber optics cable, co-axial cable

17. In data communication, which of the following cannot be considered as a transmission impairment of a medium?

(1) Attenuation
(2) Data rate
(3) Distortion
(4) Noise
(5) Low latency

[See page no. 4

18. Which of the following memories and secondary storage devices is in the ascending order of data accessing speed from left to right?

(1) Main memory → Hard disk → Cache memory → Register
(2) Hard disk → Main memory → Cache memory → Register
(3) Main memory → Cache memory → Hard disk → Register
(4) Main memory → Cache memory → Register → Hard disk
(5) Register → Main memory → Cache memory → Hard disk

19. "Using of software by others without the consent of their legal owners is called ……".

(1) Plagiarism
(2) Phishing
(3) Open source
(4) Proprietary
(5) Piracy

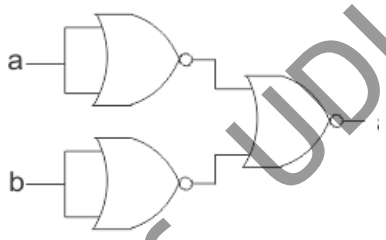
20. In an operating system, a process is changing its state from running to ready in process state transition diagram is.

(1) Process is discarded by another process
(2) Process is blocked for another application
(3) Process is waiting for I/O event
(4) A new process is created
(5) A process is terminated

21. Which of the following protocol converts a website name www.doenets.lk into network address?

(1) HTTP (2) FTP (3) DHCP (4) DNS (5) POP

22. Consider the following logic circuit.



Which of the following logic is equivalent to the logic given by the logic circuit above?

(1) OR (2) AND (3) NOR (4) NOT (5) NAND

23. Which of the following indicates maximum number of networks and hosts respectively in a class A network?

(1) 2^8, 2^{24} (2) 2^{16}, 2^{16} (3) 2^{24}, 2^8 (4) 2^8, 2^8 (5) 2^8, 2^{16}

[See page no. 5

24. Consider the following statements about cache memory in a desktop computer.

A – L1 cache memory has more capacity than L2 cache memory

B – L1 cache memory has more data accessing speed than L2 cache memory

C – Cache memory is made of static random access memory (SRAM)

Which of the above is /are correct statement(s)?

(1) A only (2) B only (3) A,B only (4) B,C only (5) A,B,C all

25. The performance of a computer increases generally when the capacity of RAM is increased. Because of,

(1) increasing virtual memory

(2) high capacity of RAM is fast

(3) Occurring low rate of page faults

(4) Occurring low rate of segmentation faults

(5) Occurring low rate of frame faults

26. In a typical desktop computer, the following hardware component is called …….

(1) Power supply unit

(2) Central Processing Unit (CPU)

(3) Random Access Memory (RAM)

(4) Motherboard

(5) Hard disk

27. Which of the following is correct about the function of basic input output system (BIOS) in a computer?

(1) It provides physical interface for many devices

(2) It provides the programs for central processing unit to communicate with other devices

(3) It provides memory spaces to load applications from hard disk

(4) It provides electric power to start computer

(5) It provides memory space required by computer

28. Consider the following statements about TCP connection in computer network.

A – Reliable data transfer

B – Connection-oriented

C – Guaranteed delivery

Which of the above is /are correct?

(1) A only (2) B only (3) A,B only (4) B,C only (5) A,B,C all

[See page no. 6

29. "In an operating system, suspending the current process temporarily and resuming it again or starting another process is called ……".
Which of the following is appropriate to fill the bank in?
(1) Frame
(2) Context switch
(3) Process Control Block (PCB)
(4) Program
(5) Page

30. Consider the following statements about fiber optics cable.
A - Attenuation is very low
B - Bandwidth is high
C - More immune to electromagnetic interference
Which of the above is/are correct?
(1) A only (2) B only (3) A,B only (4) B,C only (5) A,B,C all

31. Consider the following statements about operating system.
A - Scheduling processes
B - Allocating memory required for processes
C - Handling files and folders
Which of the above is /are the function(s) of file management in an operating system?
(1) A only (2) B only (3) C only (4) A,C only (5) A,B,C only

32. Which of the following is appropriate to connect a sound card on a motherboard of a desktop computer?
(1) PS/2 port
(2) PCI express slot
(3) Memory slot
(4) Power socket
(5) AGP slot

33. If address of a network is 149.75.10.0/27, what is the maximum number of hosts that could be connected on it?
(1) 64 (2) 140 (3) 60 (4) 30 (5) 192

34. Consider the followings.
A – Random Access Memory (RAM)
B - Hard disk
C - Register
D - Cache memory
E - Flash memory
Which of the above is/are volatile memory / memories?
(1) A only (2) B,C only (3) A,C,D only (4) C,D,E only (5) A,B,C only

[See page no. 7

35. In an operating system, which of the following(s) a process control block (PCB) contain(s)?

A - Process state

B - Program counter

C - I/O status information

(1) A only (2) B only (3) A, B only (4) A, C only (5) A, B, C all

36. "…… decides which process in ready state to be processed".

Which of the following is appropriate to fill the bank in?

(1) Short-term scheduler

(2) Medium-term scheduler

(3) State

(4) Swapping

(5) Long-term scheduler

37. Which of the following statement(s) is / are correct about virtual memory?

A - It is called logical memory

B - Its capacity is more than the physical memory

C - Its capacity is limited

(1) A only (2) B only (3) C only (4) A, B only (5) A, B, C all

38. Consider the following statements relating to computer network.

A - DHCP server maps domain name into the corresponding IP address

B - DNS server resolves IP addresses to computers

C - Proxy server shares the Internet connection among computers

Which of the above is /are correct statement(s)?

(1) A only (2) B only (3) C only (4) B,C only (5) A,B,C all

39. Which of the following statement is true about the uniform resource locator (URL) https://www.xyz.lk/calc.php?

(1) Top-level domain is xyz.lk

(2) calc.php is a protocol

(3) www is a service of the Internet

(4) https is a web page

(5) lk is a file

40. Consider the followings.

A - Amplitude B - Frequency

C - Wavelength D - Phase

Which of the above can be considered as the properties of a signal?

(1) A only (2) D only (3) A,B only (4) B,C only (5) A,B,C,D all

****

[The end

Do not write in this column

G.C.E. (A/L) Examination – March 2020

Information & Communication Technology (ICT)

Conducted by Field Work Center (FWC), Thondaimanaru

In Collaboration with the Northern Provincial Education

தகவல் தொடர்பாடல் தொழினுட்பவியல் I, II Information & Communication Technology I, II	Three hours Gr. 12 (2021)	20	E	I,II

Structured Questions **Answer for all questions**

1.

(a)

Each of the following situation is related to operating system. Fill the banks in from choosing appropriate terms given below in the following table.

	Description	Appropriate terms
(i)	This scheduler decides which processes are to be admitted to the ready queue	……
(ii)	It acts as an interface between computer hardware and users	……
(iii)	In the operating system, it is a data structure containing the information needed to manage a particular process.	……
(iv)	This is used to map the process pages used by the application into physical memory frames used by the hardware to process instructions	……

[**Lists:** operating system, short term scheduler, page table, process, long term scheduler, medium term scheduler, virtual memory, process control block]

Do not write in this column

(b) Files are allocated disk spaces by operating system. State three ways used by operating system for it.

……

……

……

(c) Which of the way, stated by you in **(b)** above, does contain external fragmentation among files largely?

……

(d) If a computer system uses 16-bits memory address bus and it uses byte addressable memory system to access any memory unit.

(i) What is the maximum number of address spaces represented by this memory system? Show your computations.

……

……

(ii) What is the range of address spaces for this system?

……

……

(iii) Calculate the maximum capacity generated by this memory. Show your computations.

……

……

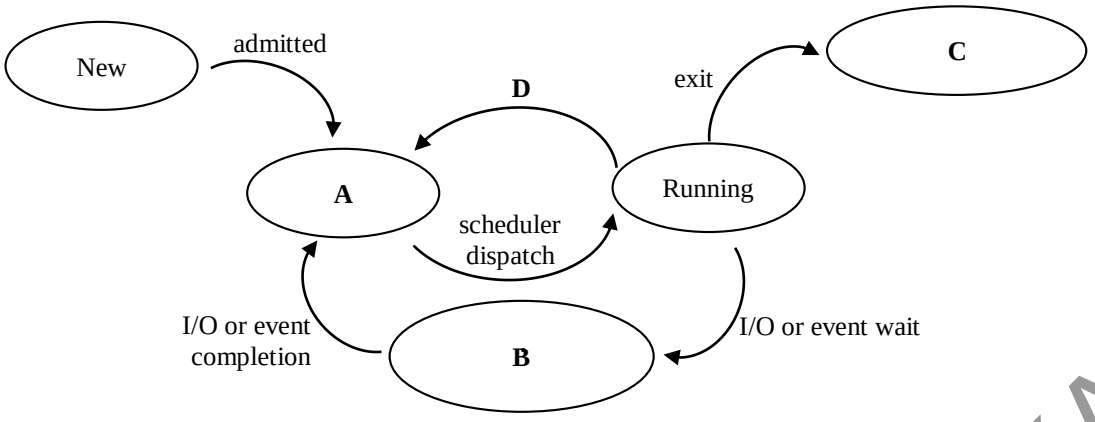
……

……

……

Do not write in this column

(e) Consider the following process transition diagram of a multitasking operating system.



Write down appropriate terms for the labels A, B, C and D.

A	
B	
C	
D	

2.

(a) State whether the following charactersitics are true, if it contains the characteristics of packet switching or false, otherwise.

(i) Using of dedicated physical path (……)

(ii) Packets arrive in order (……)

(iii) Packets follow the different route (……)

(iv) Fixed use of bandwidth (……)

(b) State any two major fucntions operating by the protocol in network layer of the OSI network reference model.

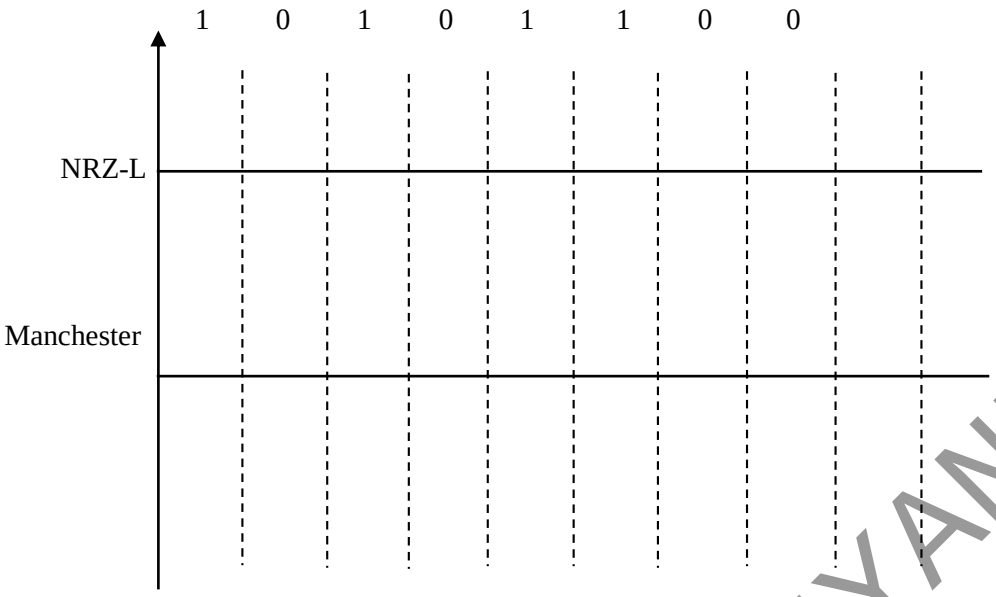
……

……

……

Do not write in this column

(c) In data communications, draw signal encoding systems each for the data 10101100 given in the following diagram.



(d) In data communications, Parity bit method is easy way to detect error. Underline in the last column of the table given below whether the following bit patterns are containing error or no error.

	Bit patterns received	**Parity bit method**	**State**
(i)	11010011	odd	Error / No error
(ii)	00111101	even	Error / No error
(iii)	10101011	even	Error / No error
(iv)	11100010	odd	Error / No error

3.

(a) Add 19_{10} and (-13_{10}) by using 8-bits two's complement method. Show your computations.

……

……

……

……

……

Do not write in this column

(b) Consider the following Boolean expression.

$(A + B + C)(A + B + \bar{C})(A + \bar{B} + C)(A + \bar{B} + \bar{C})(\bar{A} + \bar{B} + C)$

(i) Simplify the Boolean expression given above by using Karnaugh map.

(ii) Draw a logic circuit for the simplified Boolean expression.

(iii) Write down the Boolean expression given above into standard SOP form by using Karnaugh map or other ways.

(c)

The steps for the booting sequence of a computer are given below in the list. Write down them in order.

[CPU, POST, Power good, Boot Loader, Operating System]

① ……

② ……

③ ……

④ ……

⑤ ……

Do not write in this column

(d) In an operating system, write down two ways for inter-process communication.

……

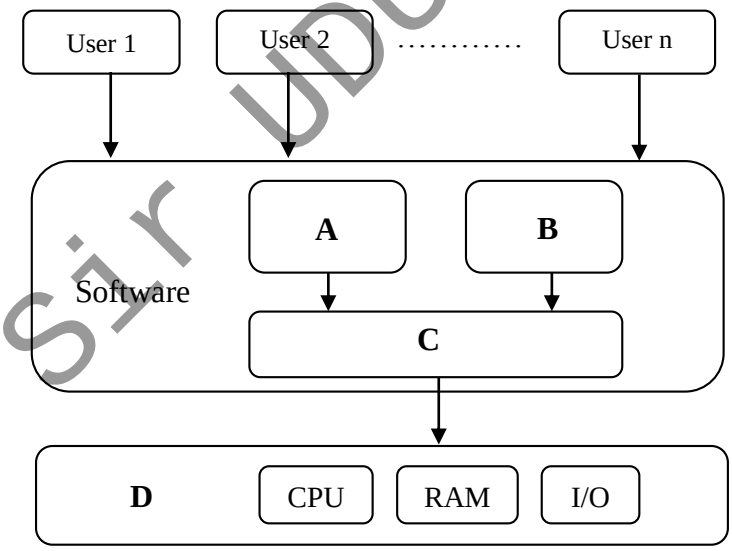
……

4.

(a) Classify the following software whether they are "application software" or "system software" (Write down answer in the last column of the table).

	Software	**Type of software**
(i)	Ubuntu Linux	
(ii)	Adobe Photoshop	
(iii)	Open office.org writer	
(iv)	MS-Windows	
(v)	Internet Explorer	
(vi)	Mac OS X	

(b) Overview diagram of an operating system is given below. Write down for the labels A, B, C and D by choosing the words from the list given below.



A ……..

B ……..

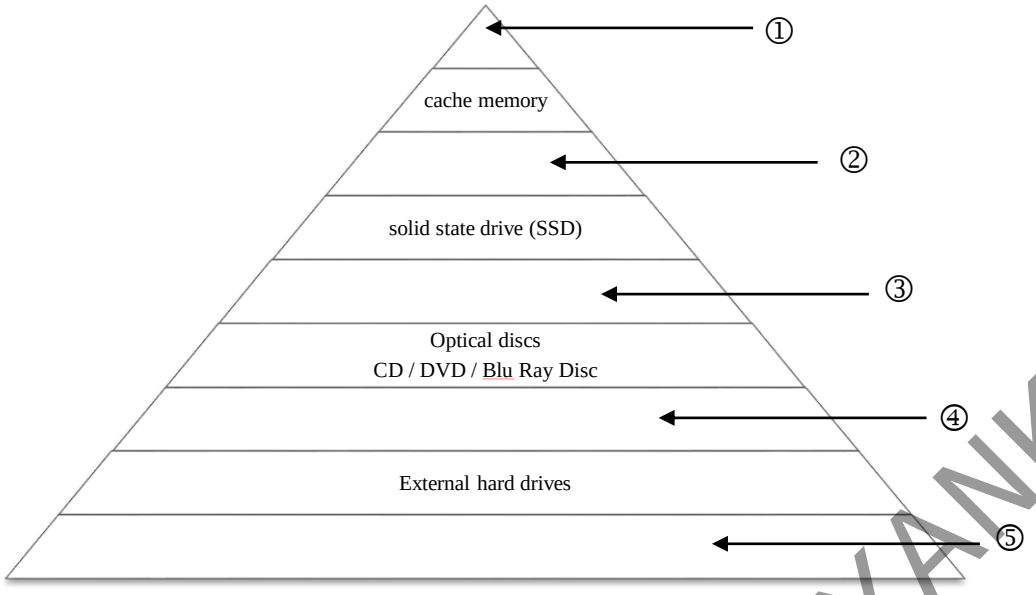
C ……..

D ……..

Lists: [Hardware, Application software, System software, Operating system]

Do not write in this column

(c) The memory hierarchy diagram is given below. Fill the blanks in by using appropriate words given in the following lists.



Lists: [USB drive, main memory, Register, Remote storage, Hard disk]

① .....

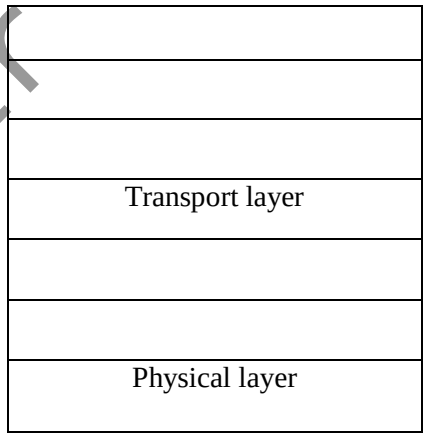
② .....

③ .....

④ .....

⑤ .....

(d) An incomplete diagram of the OSI network reference model used in computer networks is given below. Fill the blanks in approriate way.



*****

G.C.E. (A/L) Examination – March 2020

Information & Communication Technology (ICT)

Conducted by Field Work Center (FWC), Thondaimanaru

In Collaboration with the Northern Provincial Education

தகவல் தொடர்பாடல் தொழினுட்பவியல் I, II Information & Communication Technology I, II	Three hours Gr. 12 (2021)	20	E	I,II

Part – II B

Answer any two questions only

1. Consider the following scenario.

When someone is standing on doormat outside the front door of a house at night, the lamp is automatically turned on. There is a pressure sensor on the doormat and a manual switch is also attached to this circuit. When the manual switch is turned on manually or when someone stands on the doormat at night, the lamp automatically lights up.

The logical value is 1 when someone is standing on the doormat. The logical value is 0 when the environment is dark. The logical value is 1 when the manual switch is in on state. Also the logical value is 1 when the lamp is lights up.

A logic circuit diagram is to be setup for turning on or off the lamp.

(a) Write down Boolean expression for the output of the electronic system given above.
(b) Construct truth table for the Boolean expression obtained in **(a)** above.
(c) Draw logic circuit for the Boolean expression obtained in **(a)** above by using AND, OR and NOT logic gates.
(d) Draw the logic circuit again for the Boolean expression obtained in **(a)** above by using NAND gates only.

2.

(a)
(i) What does 'process' mean in relation to an operating system?
(ii) Write down the steps briefly occurring in 'context switching' process.

(b)
(i) Briefly explain one benefit that a computer can get from using virtual memory.
(ii) A computer system is a byte addressable. It has a 64 MB size of physical memory space, while it uses a 4 GB size of logical memory space. If the size of a page is 4 KB, calculate the number of pages, the number of frames, and the number of entries required for the page table.

3.

(a) Which of the following each applications would you use for TCP or UDP? Give a reason for your choice.

(i) File transfer

(ii) Watching a real time streamed video

(iii) Web browsing

(b) Consider the following scenario.

A company in Colombo has its head office and three other departments within a single large building. Each (head office and departments) has approximately 60 computers. For this purpose, the IP block is provided as 192.168.1.0 / 24. You are asked to assign IP addresses to all computers (hosts and servers) for the head office and other departments. For this purpose, 4 subnets are needed to be set up. This network is connected to a public IP address for the Internet usage of the employees. A firewall is established for network security. In addition, you are provided with 5 network switches, the required network cables, proxy server and DHCP Server. The head office subnet is connected directly to the Internet.

Draw a network diagram. Show all the IP addresses, network devices and servers clearly.

Note: Use the following table to allocate IP addresses for computers.

Subnet	Network address	Subnet mask	IP address range
Head office			
Department 1			
Department 2			
Department 3			

*****