General Certificate of Advanced Level Examination

Term – 2, 2022

Conducted by Field Work Center (FWC), Thondaimanaru

Information & Communication Technology (ICT)

தகவல் தொடர்பாடல் தொழினுட்பவியல் I **Information & Communication Technology** **I**	**Three hours** *Gr. 12 (2023)*	**20**	**E**	**I**

Instructions:

❖ *Answer all the 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.*

Part – I

1. The memory which is located in the central processing unit is considered as the fastest memory. Which of the following is correct?
(1) Cache memory
(2) Extended memory
(3) Virtual memory
(4) Register
(5) Main memory

2. Analytical engine developed by Charles Babbage is based on …………………… Technology. Which of the following is correct to fill the blank in?
(1) First generation
(2) Second generation
(3) Third generation
(4) Fourth generation
(5) Mechanical

3. It is expected to input date of birth of students for student's registration on a webpage. If the data is entered in the form of YYYY/MM/DD, which of the following data validation method is most appropriate for this purpose?
(1) Format check
(2) Range check
(3) Length check
(4) Limit check
(5) Presence check

4. Consider the following statements.

   A - Data are processed as soon as they are collected

   B - Data are always up-to-date

   C - Payroll preparation system

   Which of the above is /are correct about batch processing?

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

5. Consider the following statements.

   A - Performing POST (power on self test) process

   B - Providing electric power required for motherboard

   C - Loading of basic device drivers to the memory

   Which of the above is /are correct about basic input output system (BIOS)?

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

6. Consider the following statements about dynamic random access memory (DRAM).

   A - It is faster than static random access memory (SRAM)

   B - It is used as the technology of cache memory

   C - It contains more density than that of static random access memory

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

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

7. Which of the following is an ascending order of memory and storage devices based on speed from left to right?

   (1) Register, floppy disk, harddisk, main memory

   (2) Main memory, floppy disk, harddisk, register

   (3) Floppy disk, harddisk, main memory, register

   (4) Harddisk, floppy disk, main memory, register

   (5) Floppy disk, main memory, harddisk, register

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

   (1) It provides physical interfaces for various devices

   (2) It provides programs for communicating central processing unit with other peripherals

   (3) It provides memory space for loading of applications from harddisk

   (4) It provides electric power required for functioning of computer

   (5) It provides memory spaces required for computer

9. "………………….. is an economic and social inequality related to the access, use or impact of information and communication technologies". Which of the following is appropriate to fill the blanks in?

   (1) Plagiarism

   (2) Piracy

   (3) Digital divide

   (4) Privacy

   (5) Phishing

10. Which of the following factor(s) can be used to compare various characteristics of computer memories?
   A - Physical size
   B - Speed
   C - Capacity
   D - Density
   (1) A only   (2) B only   (3) B,C only   (4) B,C,D only   (5) A,B,C,D all

11. Two's complements of $+18_{10}$ and (-16_{10}) are respectively.
   (1) 00010010_2, 11110000_2 (2) 10000110_2, 10010111_2 (3) 00001001_2, 11111010_2
   (4) 11100110_2, 11100011_2 (5) 00010010_2, 00010000_2

12. Which of the following is equivalent to 10110.101_2?
   (1) 22.625_{10} (2) 22.625_{10} (3) 22.625_{10} (4) 22.625_{10} (5) 22.625_{10}

13. If $P = 10100010_2$ and $Q = 11101010_2$, what is the value of P XOR Q?
   (1) 01101110_2 (2) 11100010_2 (3) 00010101_2 (4) 01001000_2 (5) 10001010_2
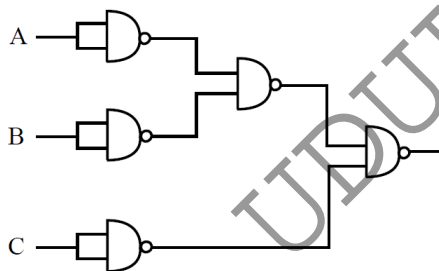

14. Which of the following is /are equivalent to $FAE_{16} + 79_{10}$?
   A - 111111101101_8 B - 7575_8 C - FED_{16}
   (1) A only   (2) A,B only   (3) A,C only   (4) B,C only   (5) A,B,C all

15. Which of the following is /are equivalent to Boolean expression $F = ABC + \bar{A} + A\bar{B}C$?
   A - $\bar{A} + C$ B - $B + \bar{A}C$ C - $AC + \bar{A}$
   (1) A only   (2) A,B only   (3) B,C only   (4) A,C only   (5) A,B,C all

**16.** Which of the following Boolean expression is equivalent to the logic circuit given below?

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

17. What is the simplified Boolean expression is given by the following Karnaugh map?

BC \ A	00	01	11	10
0	1	0	1	1
1	1	0	0	1

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

18. Which of the following Boolean expression(s) is /are equivalent to the output X of the following logic circuit?
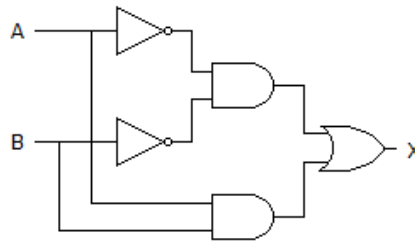
A - $AB + \overline{(A + B)}$ B - $AB + \bar{A}.\bar{B}$ C - $\bar{A}\bar{B} + B$

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

19. Consider the following statements about adder used in digital logic circuits.

A - Half-adder obtains two binary inputs

B - Half-adder gives two binary digits as outputs

C - By using two half-adders, a full-adder can be created

Which of the above is /are correct?

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

20. Consider the followings.

A - Redhat Linux

B - Mac OS

C - MS-Windows

Which of the above is /are open source operating system(s)?

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

21. "The operating system allocates the memory needed by each processes". Its main function associated with this is called.

(1) Process management

(2) Network management

(3) Hardware management

(4) Memory management

(5) File management

22. Which of the following is in the Process Control Block (PCB) in an operating system?

(1) Hardware details

(2) BIOS details

(3) Details about input devices

(4) Details about output devices

(5) Process number

23. Consider the following statements about operating system.

A - System initialization

B - Execution of a process

C - A user request for creating a new process

Which of the above is /are the major events for creating processes?

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

24. In an operating system, "……………… is a hardware component that maps addresses between virtual and physical memory". Which of the following is appropriate to fill the blank in?

(1) Memory management unit (MMU)

(2) Process control block

(3) Scheduler

(4) Page table

(5) Page

25. In the operating system, "……………………….. helps to increase the file accessing speed by consolidating the fragmented files on the hard disk. Which of the following is most suitable for filling the blank?

(1) Fragmentation   (2) Disk partition   (3) Defragmentation

(4) Task manager   (5) File manager

26. Consider the following statements about File Allocation Table (FAT).

A - Table consists of an entry for each file block

B - A directory is maintained for indexing blocks

C - The directory of the table is referenced to the first block of the file

Which of the above is /are correct?

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

27. Consider the following statements relating to DHCP server.

A - It resolves IP addresses to computers dynamically

B - It shares an Internet connection among many computers

C - It converts data packets reveived from private IP addresses to public IP address

D - It maps domain name to the corresponding IP address

Which of the above is /are correct?

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

28. How many maximum of subnets and hosts per each network may be provided by network address 173.16.0.0/18?

(1) 7 subnets, 30 hosts each   (2) 4 subnets, 4094 hosts each

(3) 8 subnets, 30 hosts each   (4) 8 subnets, 2046 hosts each

(5) 8 subnets, 8190 hosts each

29. Which of the following IP address belongs to class C?

(1) 193.168.1.4   (2) 139.67.3.5   (3) 10.6.5.7   (4) 126.7.6.4   (5) 224.5.64.1

30. "OSI network reference model layer that handles end-to-end data delivery" is called …………………… Which of the following is suitable for filling the blank?

(1) Application layer   (2) Datalink layer   (3) Presentation layer

(4) Network layer   (5) Transport layer

31. Which of the following changes during amplitude modulation in data communication?

(1) Phase only   (2) Frequency only   (3) Amplitude, frequency only

(4) Amplitude only   (5) Amplitude, phase only

32. In a computer network, the IP protocol works in the OSI network reference model at the ………………….. layer. Which of the following is the most suit able for filling the blank?

(1) Physical   (2) Transport   (3) Network   (4) Datalink   (5) Application

33. Consider the following statements about fiber optic cable.

A - More expensive than twisted pair cable

B - Contains more attenuation in comparing with other copper cables

C - Higher data rate than co-axial cable

Which of the above is /are correct?

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

34. In computer networks, which of the following is a correct data encapsulation?

(1) frame, bit, packet, segment, data   (2) segment, bit, frame, packet, data

(3) bit, frame, packet, segment, data   (4) packet, frame, bit, segment, data

(5) data, packet, bit, frame, segment

35. Which of the following is a valid subnet mask?

(1) 255.255.240.0   (2) 192.255.0.255   (3) 0.0.255.255   (4) 255.256.255.224   (5) 5.255.0.0

36. Which of the following is used to represent MAC address?

(1) Binary   (2) Decimal   (3) Octal

(4) Hexadecimal   (5) Binary and octal

37. Which of the following(s) is /are the characteristic(s) of TCP in comparison with UDP?

A - Connection-oriented   B - Low overhead

C - Ordered sequence of data packets   D - Unreliable

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

38. Which of the following is a function of IMAP (Internet Mail Access Protocol)?

(1) Monitoring network devices in the Internet

(2) Helping users to receive e-mail messages from mail server

(3) Sending e-mail messages to mail server

(4) Transferring files from one computer to another in the Internet

(5) Routing data packets in the Internet

39. Person P likes to send the message SECURE to person Q securely. For this, he /she encrypts that message by using +3 encryption key. Which of the following may be the encrypted / cipher text?

(1) VHFXUH   (2) SCREUE   (3) HUXFHV   (4) SECURE   (5) ERUCES

40. Consider the followings.

A - Data encryption   B - Digital signature   C - Hacking   D - Phishing

Which of the above can be considered as the security systems for computer and data?

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

[40x1 = 40 Marks]

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[end.

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தகவல் தொடர்பாடல் தொழினுட்பவியல் **II** Information & Communication Technology **II**	**ICT** Gr. 12 (2023)	**20** **E** **II**

Part – II A
Answer all questions

1.
(a)

(i) Explain one of the service of cloud computing "Software as a Service (SaaS)" briefly, and give one suitable example for it.

……

……

……

……

[2 marks]

(ii) Write down an advantage of cloud computing.

……

……

[1 marks]

(iii) Write down a disadvantage of cloud computing.

……

……

[1 marks]

(b)

(i) Give 17_{10} in the form of two's complement in 8-bits.

……

……

[2 marks]

(ii) Give -23_{10} in the form of two's complement in 8-bits.

………………………………………………………………………………………………

………………………………………………………………………………………………

[2 marks]

(iii) Calculate $17_{10} - 23_{10}$ in the form of two's complement in 8-bits.

………………………………………………………………………………………………

………………………………………………………………………………………………

[2 marks]

2.

(a)

(i) Choose and write down volatile memories only in the list given below.

  Lists: [Read only memory, Random access memory, Register, Cache memory, Harddisk]

………………………………………………………………………………………………

………………………………………………………………………………………………

[2 marks]

(ii) Write any two advantages that users can get from open source software compared to proprietary software.

………………………………………………………………………………………………

………………………………………………………………………………………………

[2 marks]

(b) Write each of the following statements **True** or **False** in the spaces provided.

  (i) The practice of using software without the legal permission of its owner is called open source software ……………………….

  (ii) The use of small and portable computing devices connected to a central host server over a wireless network is called mobile computing …………………………..

  (iii) The act of using one's work and ideas as one's own is called software piracy…………………………….

  (iv) Phishing is the attempt to capture information such as usernames, passwords and credit card details for malicious activities by impersonating a legitimate/trustworthy entity in the Internet communication . …………………………….

(v) Telecommuting is a work arrangement using information communication technology and tools in which employees do not travel to a central workplace. ………………………….

(vi) Digital divide is a concept that uses computer networks including personal computers and mobile devices and helps in retrieving and storing information from anywhere at any time.……………………..

[3 marks]

(c) Match the columns X and Y in the following table as appropriate.

No.	Column X	No.	Column Y
(i)	Program counter	①	A computer program that controls and operates devices connected to a computer
(ii)	Cache memory	②	Data and information are not lost even when the computer is powered off
(iii)	POST	③	It is used to save the settings of the BIOS program
(iv)	Device driver	④	Contains a copy of frequently used instructions in main memory
(v)	CMOS battery	⑤	This is a series of tests that the computer's BIOS program performs to determine whether the computer's keyboard, random access memory, disk drives, and other hardware are working properly when the computer is powered on
(vi)	Non-volatile memory	⑥	It contains the address of the next instruction to be executed by the program

(i) …………………….   (iv) ………………………

(ii) …………………….   (v) ……………………….

(iii) …………………….   (vi) ………………………

[3 marks]

3.

(a) Write in the box next to which layer of the OSI network reference model each of the following protocols and network connectivity devices operates.

No.	Protocols / Network connectivity devices	Name of the Layer
(i)	TCP	
(ii)	Network switch	
(iii)	IP	
(iv)	HTTP	
(v)	Router	
(vi)	Network Hub	
(vii)	POP	
(viii)	FTP	

[4 marks]

(b) State each of the following statements about data communication and computer networks as **True** if correct and **False** if incorrect.

(i) The transport layer is mainly concerned with the syntax and semantics of the information exchanged between the two systems.

(ii) In amplitude modulation (AM), the amplitude and phase are changed so that the frequency remains unchanged.

(iii) IP (Internet Protocol) is a connection-oriented protocol.

(iv) Flow control in a computer network works in the data link layer of the OSI network reference model.

(v) The media access control (MAC) layer establishes a connection between the logical link control (LLC) layer and the physical layer of the network. It is used to transfer data packets over the network.

(vi) In circuit switching, when data is generated from a data source, it is divided into small parts called packets. Each packet has a uniquely identifiable header. Also, each packet is randomly sent via the different paths.

No.	True / False
(i)	
(ii)	
(iii)	
(iv)	
(v)	
(vi)	

[3 marks]

(c) Consider the following scenario.

The sending computer A sends the character G (1110001) while it uses the odd parity bit method for error detection. What data will be sent by A? and briefly explain what the operation the receiver will perform to detect any error that may occur during this process.
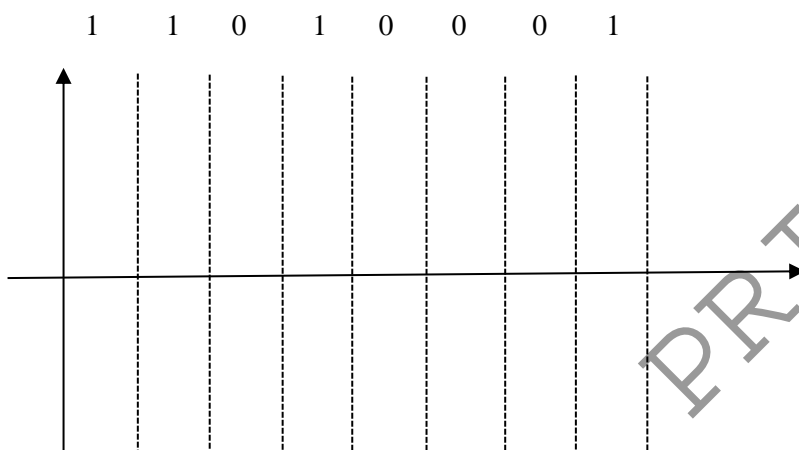
………

………

………

[1 marks]

(d) Draw the following diagram of the Manchester signal encoding while transmitting the data 11010001.

| 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |

[2 marks]

4.

(a) Consider a computer that can use 16-bit virtual addresses ranging from 0 to 64K. Assume that the size of the physical memory of this computer is 32 KB and the size of a page is 4 KB.

(i) How many bits are needed to store a page number?

………

[1 marks]

(i) How many bits are needed to store a frame number?

………

[1 marks]

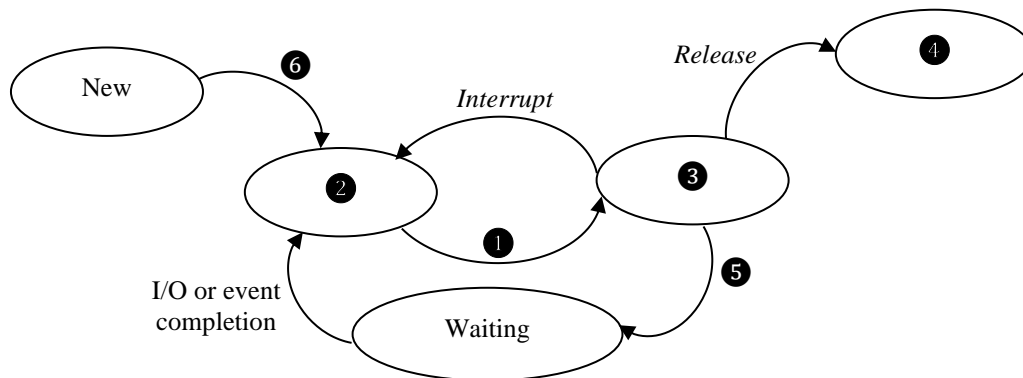**(iii)** How many bits needed are to store virtual memory offset?

………

[1 marks]

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

Write down suitable terms for the labels ❶,❷,❸,❹,❺ and ❻ in the following spaces.

❶ …………………………………………….

❷ …………………………………………….

❸ …………………………………………….

❹ …………………………………………….

❺ …………………………………………….

❻ …………………………………………….

[3 marks]

(c) Write one advantage and one disadvantage of the continuous space allocation method used in an operating system.

Advantage…………………………………………………………………………………………..

………………………………………………………………………………………………………

Disadvantage…………………………………………………………………………………………..

………………………………………………………………………………………………………

[2 marks]

(d) Write one characteristics of the linked space allocation method used in an operating system.

………………………………………………………………………………………………………

………………………………………………………………………………………………………

[2 marks]

*****

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Information & Communication Technology	**II**	*Gr. 12 (2023)*			

Part – II B

Answer all questions

(5) Consider the following Boolean expression.

$AB\bar{C} + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC$

(a) Complete the following Karnaugh map to represent the Boolean expression given.

AB \ C	0	1
00		
01		
11		
10		

[3 marks]

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

[2 marks]

(c) Construct truth table for the simplified Boolean expression.

[3 marks]

(d) Write down Boolean expression in standard POS (Product of sums) from the Karnaugh map or other method.

[2 marks]

(6)

(a) Write down any two functions of network layer of OSI network reference model.

[1 marks]

(b) Give one reason why UDP may be used instead of TCP in an application for live telecasting (webcasting).

[1 marks]

(c) Consider the following scenario.

A medium sized company manufacturing soft drinks in capital city has four departments namely Information Systems, Production, Accounting and Sales. All four departments use separate local area networks (LANs).

Each department has the number of computers as given in the table below.

Departments	Number of computers in each department	Number of network printers in each department
Information Systems	*10*	*2*
Production	*8*	*1*
Accounting	*16*	*2*
Sales	*22*	*1*

The network administrator is assigned an IP block of 195.1.1.0/24. The network administrator must assign IP addresses to all the nodes in each department. Four sub-networks will be set up for this purpose. Also, all the departments are connected to a common IP address for Internet access of the network employees. The Information Systems Department is directly connected to the Internet. Each department is located in different separate buildings in an area. A firewall is installed for the security of the network and four network switches, network cables, proxy server and DHCP server are provided to the network administrator for this purpose.

(i) Draw a network diagram for this situation. Clearlyy show all network cables, network connectivity devices and servers.

[4 marks]

(ii) Assign IP addresses to all computers using the following table as a guide. For this, use variable length subnet mask **(VLSM) only**.

[4 marks]

No.	Departments	Network address	Broadcast address	Subnet mask	Usable IP address range
1.	Information Systems				
2.	Production				
3.	Accounting				
4.	Sales				

*****