G.C.E. (A/L) Examination

First Term – July 2022

Conducting By

Fieldwork Center (FWC), Thondamanaru
Information & Communication Technology (ICT)

Grade 12 (A/L) 2023	Part – I	Time:3 hours

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. Which of the following refers to the economic and social inequality associated with the use and access of information and communication technologies or its impacts?

(1) Digital divide

(2) Phishing

(3) Plagiarism

(4) Privacy

(5) Piracy

2. Consider the following statements about open source software.

A - They are always provided free of charge to the users

B - Users are given the freedom to modify or redistribute the software as they become available with their source code

C - Ubuntu Linux is an open source software

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

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

3. Which of the following is called the decoding component of the instructions brought into the central processing unit?

(1) Main memory

(2) Arithmetic logi unit

(3) Control unit (CU)

(4) Register unit

(5) Program counter

4. Which of the following statement is true about the history of computer?
   (1) Blaise Pasca; designed adding machine
   (2) Pascaline was designed by John Von Neumann
   (3) Punched card was designed by John Von Neumann
   (4) Difference engine was designed by Blaise Pascal
   (5) Alan Turing desiged analytical engine

5. Which of the following group of computer memories is found in ascending order of data accessing speed from left to right?
   (1) Register → Cache memory → Main memory
   (2) Cache memory → Main memory → Register
   (3) Main memory → Register → Cache memory
   (4) Main memory → Cache memory → Register
   (5) Register → Main memory → Cache memory

6. Which of the following term is called by which software is copied and used by others without the permission of their legal owners?
   (1) Plagiarism
   (2) Phishing
   (3) Open source
   (4) Proprietary
   (5) Piracy

7. Consider the following statements about dynamic random access memory (DRAM).
   A - It is used as the technology of register
   B - It is less speed than static random access memory (RAM) technology.
   C - Its density is more than static random access memory technology
   Which of the above is / are correct?
   (1) A only   (2) B only   (3) C only   (4) B,C only   (5) A,B,C all

8. Which of the following is the best example for online processing system?
   (1) Payroll preparation system
   (2) Electricity utility bill preparation system
   (3) Flight control system
   (4) Telecommunication payment system
   (5) Water utility bill preparation system

9. Which of the following is suitable for attaching a main memory to a desktop computer's motherboard?
   (1) PCI slot
   (2) PCI express slot
   (3) Memory slot
   (4) CPU socket
   (5) AGP slot

10. Consider the followings.

A - Register

B - Harddisk

C - Random Access Memory (RAM)

D - Cache memory

E - Solid state drive (SSD)

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

11. Which of the following statements about social networking or media via the Internet is correct?

(1) They always give us real information

(2) The newspaper is no longer needed as many of them are shared

(3) In the modern world, they are essential to human life

(4) The identification of individuals in them is always guaranteed

(5) In some cases, many of the information shared in them may violate on the privacy of individuals

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

(1) Power supply unit

(2) Central processing unit (CPU)

(3) Random access memory　(RAM)

(4) Motherboard

(5) Harddisk
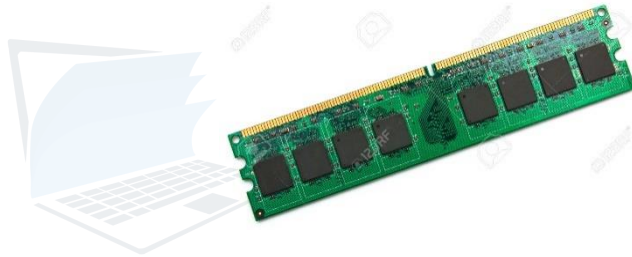
13. Which of the following is the function of basic input output system (BIOS)?

(1) It provides physical interfaces for various devices

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

(3) It provides memory space for loading applications from the hard disk

(4) It provides electric power to function the computer

(5) It provides memory space for the computer

14. Consider the following statements.

- A computer program that operates or controls a specific type of device connected to a computer.
- It provides software interfaces for hardware devices.

Which of the following reflects the above characteristics?

(1) Device driver

(2) BIOS

(3) CMOS

(4) POST

(5) EEEPROM

15. Consider the followings.

A - Ability to access files from anywhere via the Internet

B - Low software cost

C - Private data security

D - Always need an Internet connection

Which of the above is /are considered as disadvantage(s) of cloud computing?

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

16. In computer system, which of the following statement is correct about register?

(1) It has the fastest data access while it is a software

(2) It has the slowest data access while it is a software

(3) It has the fastest data access while it is a hardware

(4) It has the slowest data access while it is a hardware

(5) Statement (2) and statement (4) are only correct

17. Users are compulsorily required to enter details such as username and password when logging in to a website. Which of the following is the most appropriate data validation method for it?

(1) Presence check

(2) Range check

(3) Length check

(4) Format check

(5) Type check

18. "……………………….. is use of another person's works or ideas as one's own creation ".

(1) Plagiarism

(2) Phishing

(3) Open source

(4) Proprietary

(5) Piracy

19. Which of the following does not influence to reduce the gap of the digital divide?

(1) Developing of communication infrastructure at the village levels

(2) Creating awareness among the public about information and communication technology

(3) Providing used computers to low-income earners for learning

(4) Providing opportunities for all students in schools to learn information and communication technology

(5) Providing loans in banks to the general public

**20.** Which of the following is not considered as the part of microprocessor?

(1) Memory unit

(2) Instruction register

(3) Program counter

(4) Control unit

(5) Cache memory

21. $9.375_{10} =$

(1) 1110.01_2 (2) 1001.011_2 (3) 1001.001_2 (4) 1101.10_2 (5) 1001.110_2

22. Which of the following(s) is / are equivalent to the Boolean expression $\overline{\overline{(A + B)} + \overline{C}}$?

A $- AB + C$
B $- (A + B).C$
C $- AC + BC$
D $- \overline{\overline{(A + B)}}.\overline{\overline{C}}$

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

**23.** What is the output X of the following combined gates?

(1) A+B
(2) A.B
(3) $A \oplus B$
(4) $\overline{A \oplus B}$
(5) $\overline{A + B}$
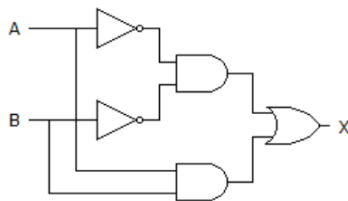
24. Which of the following(s) is / are equivalent to BCA_{16} ?

A - 5671_8
B - 101111001010_2
C - 3412_{10}

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

25. Two's complements of (-34_{10}) and $(+18_{10})$ are respectively.

(1) 10101111_2 , 10101111_2 (2) 10001111_2 , 10001111_2 (3) 00001001_2 , 11111000_2
(4) 11011110_2 , 00010010_2 (5) 11111111_2 , 11100010_2

26. Consider the following Karnaugh map.
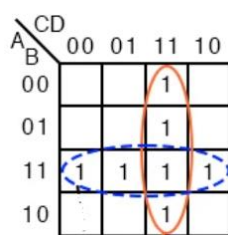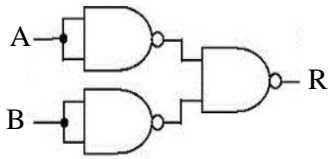

Which of the following is correct logic expression grouped in this diagram?

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

27. What would be the result of bitwise XNOR operation between two binary numbers 10100110_2 and 01011101_2 ?

(1) 00000010_2 (2) 00000100_2 (3) 10000110_2 (4) 10000010_2 (5) 11000010_2

28. Consider the following logic circuit diagram.

Which of the following Boolean logic is equivalent to the output R of the logic circuit given above?

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

29. Which of the following Karnaugh map representation is incorrect?

30. $AB_{16} + CD_{16} =$

(1) 189_2 (2) 198_2 (3) 891_2 (4) 981_2 (5) 819_2

31. What is the decimal equivalent of 77.4_8 ?

(1) 83.5_{10} (2) 67.25_{10} (3) 87.3_{10} (4) 63.5_{10} (5) 98.125_{10}

32. $101_2 \times 111_2 =$

(1) 101010_2 (2) 101011_2 (3) 100011_2 (4) 1110001_2 (5) 101100_2

33. Consider the followings.

A - Efficient calculations

B - Zero has only one representation

C - Additional bit is allocated for the sign

D - Subtractions can be done as additions

Which of the above is /are correct about two's complement?

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

34. What is the output Q of the following logic circuit?
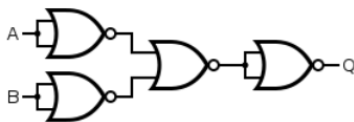
(1) $\overline{A + B}$ (2) $\overline{A.B}$ (3) $A + B$ (4) $A.B$ (5) $A \oplus B$

35. What is the decimal value of the binary value 10.1010_2 ?

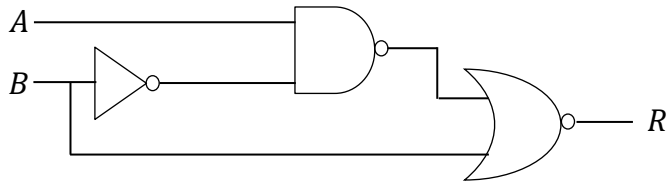(1) 2.5_{10} (2) 2.625_{10} (3) 2.375_{10} (4) 0.625_{10} (5) 1.625_{10}

36. Consider the following logic circuit.

Which of the following Boolean expression(s) is /are equivalent to the output R of this logic circuit?

A - $A\bar{B}$

B - $\overline{(A.\bar{B}) + B}$

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

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

37. What is the value of 01100011_2 - 10101101_2 ?

(1) 11110110_2 (2) 10010110_2 (3) 10110111_2 (4) 10110110_2 (5) 10110100_2

38. Consider the following Boolean function.

$f(x, y, z) = (x + y).z + x\bar{y} + (x + y).\bar{z} + \bar{x}y$

Which of the following is the simplified result of the Boolean function given above?

(1) $x + z$ (2) $y + z$ (3) $x + y + z$ (4) $(x + y).z$ (5) $x + y$

39. Consider the following Karnaugh map.

AB \ C	0	1
00	0	0
01	1	1
11	1	0
10	0	1

Which of the following Boolean expression given by Karnaugh map?

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

(4) $ABC + \bar{A}B + BC$ (5) $BC + \bar{A}C$

40. Consider the following Boolean expression.

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

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

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

(4) $(A + \bar{C})(B + C)$ (5) $(A + \bar{C})(\bar{B} + C)$

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Gr. 12 - (A/L) 2023	Part – II A
Structured questions	*Answer all the questions on this paper itself*

1.

(a) A segment of memory hierarchical diagram is given below. Fill in the blanks with the appropriate words from the list given below.

①

Cache memory

②

Solid state drive (SSD)

③

Optical discs
(CD / DVD / Blu Ray Disc)

④

External hard drives
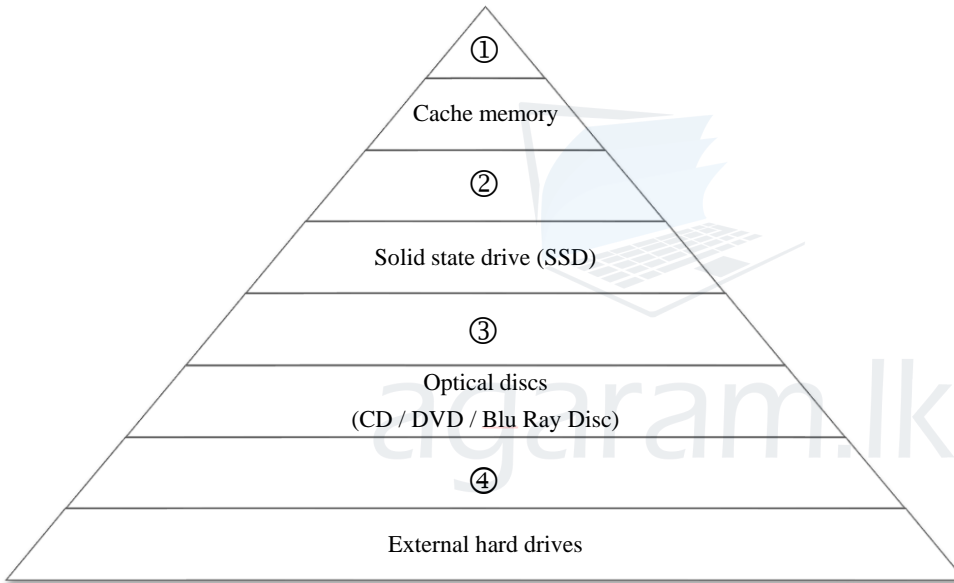
Lists: [USB drive, main memory, Register, Hard disk]

① ………………………………………………

② ………………………………………………

③ ………………………………………………

④ ………………………………………………

(b) Classify the following software whether they are "system software" or "application software" (write the 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	

Do not write in this column

(c) Give any three service models in cloud computing.

① ……………………………………………

② ……………………………………………

③ ……………………………………………

(d) Briefly explain the role of a small battery fixed on the motherboard of a desktop computer.

…………………………………………………………………………………………..

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2.

(a) Give the major technologies used in first four generations of computer.

① ……………………………………………

② ……………………………………………

③ ……………………………………………

④ ……………………………………………

*Do not write
in this column*

(b) Write down two file accessing methods used in secondary storage devices.

① ……………………………………………………………

② ……………………………………………………………

(c) Consider the followings.

ROM, RAM, SSD, Cache memory, Harddisk.

Identify and write down volatile memories only among them.

………………………………………………………………………………………..
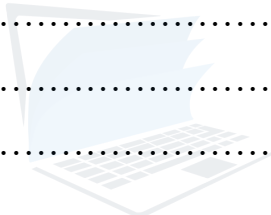
………………………………………………………………………………………..

(d) Give two benefits of online processing in comparison with batch processing.

………………………………………………………………………………………..

………………………………………………………………………………………..

………………………………………………………………………………………..

………………………………………………………………………………………..

3.

(a)

(i) Give $(+9_{10})$ in 8-bits 2's complement form. Show your computations.

………………………………………………………………………………………………

………………………………………………………………………………………………

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………………………………………………………………………………………………

(ii) Give (-5_{10}) in 8-bits 2's complement form. Show your computations.

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………………………………………………………………………………………………

Do not write in this column

(iii) Use 8-bits 2's complement form to calculate the value of $(9_{10} - 5_{10})$. Show your computations.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

(b) Consider the following Boolean expression.

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

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

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

(iii) Using of the simplified Boolean expression obtained in **(i)** above, how many minimum number of NOR gates are required to draw the logic circuit diagram by using NOR logic gates only?

4.

Do not write in this column

(a) Each of the following situations is related to the computer system. The appropriate terms for each of them are from the list below. Fill in the blanks in the selected table.

	Description	Appropriate terms
(i)	Utilization of computer networks, including personal computers and mobile devices, is a concept that can be used to retrieve and store information from anywhere, anytime.	…………………………
(ii)	It is a work arrangement using ICT tools in which employees do not go to a central workplace.	…………………………
(iii)	This type of software is available with the source code and gives users more freedom to use it.	…………………………
(iv)	This is the legal framework for protecting the rights of the creators of original works.	…………………………

[**Lists:** Teleworking, open source software, intellectual property, cloud computing, proprietary software, mobile computing]

(b) If each of the following statements is correct, indicate it as True, or otherwise, False.

(i) Frequently used instructions in computer are used in cache memory ………………………………

(ii) Generally, the capacity of L2 cache memory is more than L1 cache memory ………………………

(iii) Device driver executes or controls the specific device connected with computer …………………

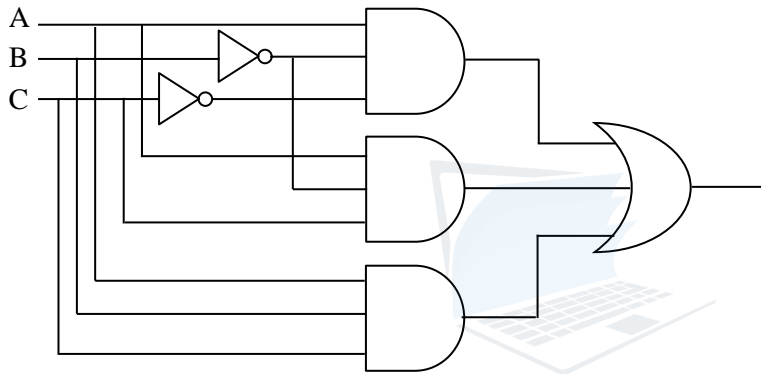**(iv)** Volatile memory is not lost data even when the power of computer is switched off ………………

(e) Explain briefly the term "software piracy".

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

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

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Gr. 12 - (A/L) 2023		**Part – II B**

Answer any two questions only.

1. Consider the following logic circuit.

(a) Write down   for the output of the logic circuit given above.

(b) Construct tuth table for the Boolean expression obtained in **(a)** above.

(c) Using Karnaugh map, simplify the Boolean expression obtained in **(a)** above.

(d) Draw the logic ciruit again using NAND logic gates only for the simplified Boolean expression obtained in **(c)** above.

2. Consider the following scenario.

A school currently uses a manual library information system. Students should obtain an application form from the library to obtain a new library membership and fill it out and submit it to the teacher-librarian in charge of the library. A small annual fee must be paid for this. Receipts are issued by the Library Assistant. Students will also be given a library membership card. When new books become available to the library, all library activities such as recording their details, lending books to students, returning them and making reservation of books in advance are recorded manually. The chances of mistakes being made and the time taken up during library activities are also observed. At the constant request of the teacher-librarian in charge of the library, the principal of the school proposes to introduce a new computer based library information system.

(a) State two of the main disadvantages that library may face as the school manages its library activities manually.

(b) Give briefly two of the main benefits that library could gain by computerizing the school's library activities.

(c) Write down two benefits that students can receive when introducing an online library information system via the Internet.

(d) Write down two benefits that teacher librarian and library assistant could gain by introducing an online library information system over the Internet.

3.

(a) Write down any two characteristics of big data.

(b) Secondary storage devices use three types of data reading and writing media mainly. Write down them.

(c) Write down three steps of fetch-execute cycle.

(d) Write down briefly POST (Power on self test) process happening during the booting process of computer system.

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