National Field Work Center,
Conducting
G.C.E. (Advanced Level) Examination – 2023 July, Term - 4

Information & Communication Technology [ICT]

தகவல், தொடர்பாடல் தொழினுட்பவியல் **I**	**20**	**E**	**I**	இரண்டு மணித்தியாலம் *Two hours*
Information & Communication Technology I				

Instructions:

 ❅ *Answer all the questions.*

 ❅ *Write down your index number in the space provided in the answer sheet.*

 ❅ *Instructions are also given on the back of the answer sheet. Follow those carefully.*

 ❅ *In each of the questions 1 to 50, pick one of the alternatives (1),(2),(3),(4),(5) which is correct or most appropriate and mark a cross (X) in accordance with the instructions given on the back of the answer sheet.*

 ❅ *Use of calculators is not allowed.*

1. Which of the following is a set of four major categories of computer hardware devices that are classified based on the functions they can perform?

   (1) Input, editing, storage, output

   (2) Input, editing, process, storage

   (3) Editing, copying, pasting, storage

   (4) Input, editing, pasting, copying

   (5) Input, storage, process, output

2. Which of the following is not considered a service of cloud computing?

   (1) Software as s Service (SaaS)   (2) Function as a Service (FaaS)

   (3) Platfrom as s Service (PaaS)   (4) Hardware as s Service (HaaS)

   (5) Infrastructure as a service (IaaS)

3. Consider the following statements.

   A - Decoding instructions

   B - Storing output

   C - Fetching instructions

   Which of the above are stages of fetch-execute cycle?

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

4. "………………………… software grants users rights to use the source code, share the software, and modify the source code". Which of the following is most suitable to fill the gap?

   (1) Application

   (2) System

   (3) Open source

   (4) Utility

   (5) Custom

5. Excessive use of the Internet for education has exposed many students to privacy issues. As a solution, many parents have installed filtering software on their children's computers. What should be the main use of this filter software?

A - Preventing students from sending personal information via email

B - Stopping students from broadcasting their personal information on the Internet

C - Preventing sharing of information such as name, address and phone numbers in chat group applications

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

6. Which of the following memory group represents the accessing speed from least to most from left to right?

(1) Cache memory → Register → Main memory → Harddisk

(2) Cache memory → Register → Harddisk → Main memory

(3) Harddisk → Cache memory → Register → Main memory

(4) Cache memory → Main memory → Register → Harddisk

(5) Harddisk → Main memory → Cache memory → Register

7. Which of the following is a required realtime processing?

A - Updating of bank account balance details when depositing money in the bank

B - Generating of customer's monthly telephone bill

C - Updating inventory when a customer buys goods in a super market

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

8. Which of the following is / are equivalent tot DEF_{16} ?

A - 6757_8 B - 3740_{10} C - 110111101111_2

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

9. If P = 10100010_2 and Q = 11101010_2 , what is the value of **P XOR Q** ?

(1) 00010101_2 (2) 11100010_2 (3) 01001000_2 (4) 00101010_2 (5) 10001010_2

10. The two's complements of $(+18_{10})$ and (-12_{10}) are respectively.

(1) 10011000_2 , 11110100_2 (2) 11111000_2 , 01101011_2 (3) 00010010_2 , 001101011_2

(4) 00010010_2 , 00010011_2 (5) 00010010_2 , 11110100_2

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

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

(1) I only   (2) III only   (3) I,III only   (4) II,III only   (5) I,II,III all

12. Consider the following Karnaugh map.

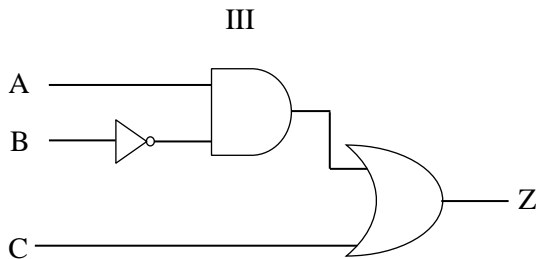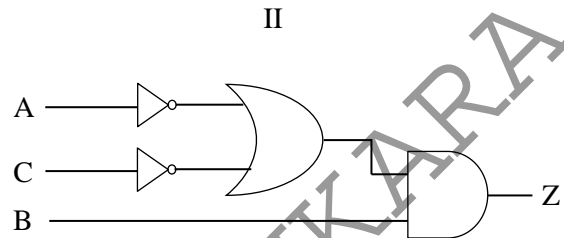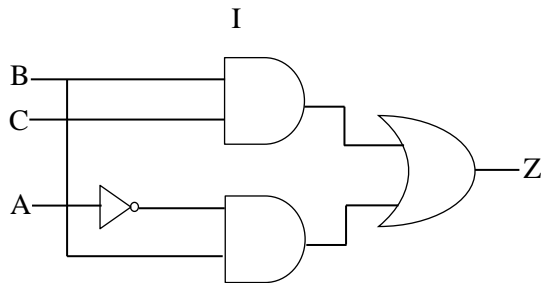| C \ AB	00	01	11	10
0	1	0	0	1
1	1	0	1	1

Which of the following Boolean expression is represented by Karnaugh map given above?

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

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

13. Consider the following logic circuit.
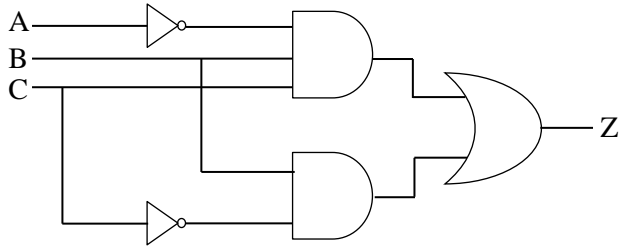
Which of the following logic circuit(s) is / are equivalent to the output of the above logic circuit?

I

II

III

(1) I only
(2) I,II only
(3) I,III only
(4) II,III only
(5) I,II,III all

14. What is the simplified Boolean expression of the output **F** in the following truth table?

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

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

15. Consider the following paragraph relating to operating system.

"CPU is given only for a limited time in each process. After that time surpasses, if the process has not yet completed its task, that process is moved to the ready state and the CPU is given to another ready state process to run for a certain period of time. Another time will be given again to the first process".

What is the scheduling method mentioned in the above paragraph?
(1) Short-term scheduling   (2) Mid-term scheduling   (3) Long-term scheduling
(4) Pre-emptive scheduling   (5) Emptive scheduling

16. "……………………… is a computer hardware component which keeps all the memory references itself and mainly translates virtual memory addresses to physical addresses".

Which of the following is most appropriate to fill the blank in?

(1) Primary memory   (2) Memory management unit (MMU)

(3) Register   (4) Cache memory

(5) Translation lookaside buffer-TLB

17. The operating system uses various ways to make space allocations for files.

Among them "…………………………creates a table of pointers at the time of creating file".

Which of the following is suitable for filling the blank?

(1) Linked allocation   (2) Memory allocation   (3) Contiguous allocation

(4) Indexed allocation   (5) Harddisk allocation

18. What is a page table in an operating system?

(1) It is a component of arithmetic logic unit found in central processing unit

(2) It is a data structure that stores the pages found in main memory

(3) A data structure that maps the virtual address of the process pages to the physical address

(4) It is a hardware component found in all memories

(5) It is an another name for random access memory

19. Which of the following is not generally included in process control block (PCB) in operating system?

(1) Process number

(2) Capacity of hard disk

(3) Process scheduling state

(4) Program counter

(5) Process state

20. Consider the following process state transition diagram.
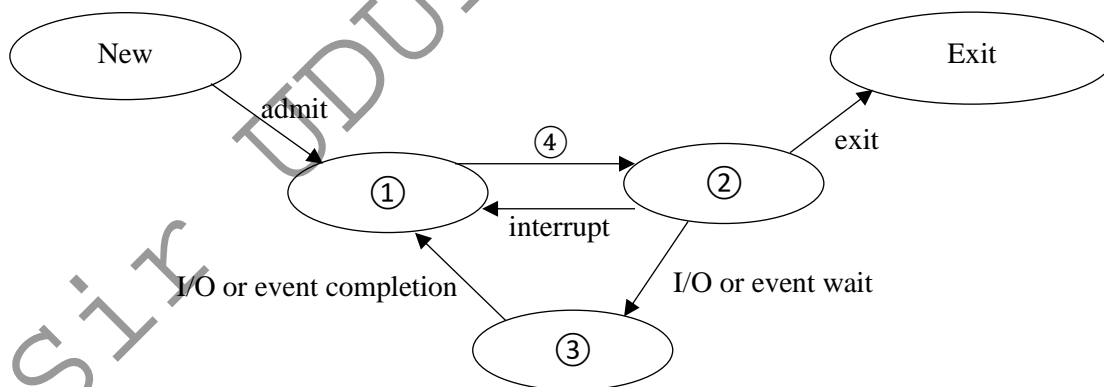
①,②,③ and ④ are respectively.

(1) Running, ready, waiting, scheduler dispatch

(2) Ready, scheduler dispatch, running, waiting

(3) Waiting, ready, running, scheduler dispatch

(4) Ready, running, scheduler dispatch, waiting

(5) Ready, running, waiting, scheduler dispatch

21. Consider the following statements.

A - A program in execution

B - Shifting the function of CPU from one process to another

C - Memory contents not currently in use are copied to the hard disk to make memory available for other processes

Which of the following is the group of words that best describes the above statements in order?

(1) Swapping, process, context switching   (2) Process, context switching, swapping

(3) Context switching, process, swapping   (4) Process, swapping, context switching

(5) Swapping, context switching, process

22. Which of the following(s) is / are example(s) of the use of the client-server model?

A - Acceptance of payment by shop cashier through a credit card

B - User can scan a document through a scanner connected to their computer and obtains a softcopy

C - Customers accesses to online banking services through web browser

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

23. Consider the following sentence.

"Using a TCP network like the Internet is used to transfer files from one computer to another. It works by opening two connections connecting computers trying to communicate with each other".

Which of the following protocol represents the sentence given above?

(1) HTTP   (2) UDP   (3) FTP   (4) SMTP   (5) MAC

24. In which layer of OSI network reference model does router act?

(1) Physical layer   (2) Application layer   (3) Data link layer

(4) Network layer   (5) Presentation layer

25. Consider the IP address 192.16.5.133/29. How many bits are required to identify the network and the host respectively?

(1) 29, 3   (2) 28, 3   (3) 30, 2   (4) 28, 4   (5) 29, 4

26. In computer networks, which of the following is / are correct about UDP?

A - Uses voice communication via the Internet

B - Reliable data transfer

C - Connection-oriented

D - Guaranteed delivery

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

27. Among the media used in digital communication and computer networking, which of the following includes only unguided media?

(1) Infrared ray, fiber optics cable, radio wave

(2) Co-axial cable, microwave, radiowave

(3) Infrared ray, microwave, twisted pair

(4) Infrared ray, microwave, radiowave

(5) Twisted pair cable, fiber optics cable, co-axial cable

28. An encryption technique that uses the same key for encryption and decryption is called.

(1) Symmetric encryption   (2) Asymmetric encryption   (3) Public key encryption

(4) Special key encryption   (5) Hybrid encryption

29. What is the correct order of data encapsulation in a computer network?

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

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

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

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

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

30. Which of the following statement(s) is / are correct?

    A - The frequency difference of a data communication medium is called its bandwidth

    B - Data rate decreases as bandwidth increases

    C - The data rate is measured in bps

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

31. Which of the following statements about computer malware is / are correct?

    A - A computer virus that replicates itself and spreads from one computer to another

    B - Trojan horse appears useful to the user before it is installed on the computer but steals useful information after it is installed

    C - A computer worm that replicates itself and uses a computer network to spread from one computer to another without user intervention

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

32. Consider the following statements regarding software process models.

    • Prescribing a timeline divided into groups to complete tasks

    • Providing step-by-step builds of software development in an iterative manner

    • Facilitating consideration and feedback of software development progress to stakeholders at each stage

    Which of the following software models satisfies the above statements?

    (1) Waterfal model

    (2) Rapid application development (RAD) model

    (3) Spiral model

    (4) Object-oriented model

    (5) Agile process model

33. Which of the following is a major task undertaken during the systems analysis phase?

    (1) During this stage, programs are tested into software testing

    (2) All programs are carried out during this stage

    (3) The database is designed during this phase

    (4) All specifications for software and hardware and development requirements are carried out in this

    (5) Final testing is done by user groups

34. Which of the following statements about customized software packages is / are correct?

    A - They are developed to meet the needs of specific users

    B - Users use most of their facilities compared to commercial off the shelf software (COTS)

    C - They are cost effective as compared to commercial off the shelf software

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

35. Consider the following table.

	Information Systems		**Description**
(i)	Enterprise resource planning (ERP) system	**(a)**	Customer account system in a bank
(ii)	Expert system	**(b)**	A system that facilitates production, marketing and sales operations in an apparel business
(iii)	Transaction processing system (TPS)	**(c)**	A System of prescribing Ayurvedic medicines using a knowledge base

Which of the following is obtained when the above are properly matched?

(1) **(i) → (a), (ii) → (b), (iii) → (c)**
(2) **(i) → (b), (ii) → (a), (iii) → (c)**
(3) **(i) → (b), (ii) → (c), (iii) → (a)**
(4) **(i) → (a), (ii) → (c), (iii) → (b)**
(5) **(i) → (c), (ii) → (b), (iii) → (a)**

36. Consider the following statements about software deployment.
   A - A small group of users within an organization using a new system before wider use is a pilot deployment
   B - Parallel deployment is a deployment in which small parts of the new system gradually replace small parts of the old system.
   C - Parallel deployment is more risky as compared to direct deployment
   Which of the above is / are incorrect?
   (1) A only   (2) B only   (3) A,B only   (4) B,C only   (5) A,B,C all

37. Consider the following statements about a data flow diagram (DFD).
   A - It represents the process model
   B - The first level dataflow diagram is further divided to obtain the second level diagram
   C - At the first level of DFD, the external entities can be considered as sources of data
   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

38. Which of the following statements about database keys is correct?
   (1) The primary key is selected from the alternate keys
   (2) Alternate key is derived from the primary key
   (3) Primary key is selected from candidate keys
   (4) Primary key is selected from foreign keys
   (5) Another name for primary key is foreign key

39. Consider the following two data tables.

Customer

Customer_id	First_name
1	John
2	Robert
3	David
4	John
5	Betty

Order

Order_id	Amount	Customer_id
1	John	10
2	Robert	3
3	David	6
4	John	5
5	Betty	8

Which of the following SQL statements should be executed to get the result given below?

Customer_id	First_name	Amount
1	John	10
2	Robert	3
3	David	6
4	John	5
5	Betty	8

(1) *SELECT Customer.customer_id, Customer.First_name, Order.Amount FROM Customer JOIN LEFT Order ON Customer.Customer_id = Order.Customer_id;*

(2) *SELECT Customer.customer_id, Customer.First_name, Order.Amount FROM Customer LEFT JOIN ON Order Customer.Customer_id = Order.Customer_id;*

(3) *SELECT Customer.customer_id, Customer.First_name, Order.Amount FROM Customer LEFT JOIN Order ON Customer.Customer_id = Order.Customer_id;*

(4) *SELECT Customer.customer_id, Customer.First_name, Order.Amount FROM Customer LEFT JOIN Order ON WHERE Customer.Customer_id = Customer_id;*

(5) *SELECT Customer.customer_id, Customer.First_name, Order.Amount FROM Customer LEFT JOIN Order ON Customer_id = Order.Customer_id;*

40. Which of the following statements best describes the cardinality of a relationship?
(1) Number of items in a relationship
(2) Number of items in an entity
(3) The minimum and maximum relational instances that an entity can participate in
(4) Number of entities in a group of corresponding to a given entity
(5) Unique information values in the columns of the table

41. Which of the following statements about weak entities is / are correct?
(1) They do not have key attributes on their own
(2) Attributes are always multivalued
(3) They possess an ownership entity
(4) Relation between weak entity and ownership entity is always 1:N
(5) They always have key attributes on their own

42. Consider the data table *Employee (EmpId, NIC, Fname, Lname, Address, Salary)*.

NIC, Fname, Lname, Address, and Salary are dependant on EmpId and Fname, Lname, and Address are dependant on NIC.

Which of the following is correct about the table given above?

(1) It is in 0NF (2) It is in 1NF (3) It is in 2NF

(4) It is in 3NF (5) It is in BCNF

Consider the following ***Doctor*** table with given attributes and data types. The *DocId* is a primary key. Use the information given below to answer questions **(43)** and **(44)**.

Doctor *(DocId varchar(3), Dname varchar(40), Salary real, Specialization varchar(50), DateHired date, Bonus real);*

43. Which of the following SQL statements can be used to remove only the details of the doctor with Id *'D001'*?

(1) *delete from Doctor where DocId='D001';*

(2) *delete in Doctor where DocId='D001';*

(3) *delete all Doctor where DocId='D001';*

(4) *delete to Doctor where DocId='D001';*

(5) *delete D001 from Doctor;*

44. Which of the following SQL statements may be used to display the doctor's name and date of appointment (DateHired) in ascending order of date of appointment?

(1) *select Dname, DateHired from Doctor order by DateHired;*

(2) *select Dname, DateHired from Doctor order by Dname and DateHired;*

(3) *select Dname, DateHired from Doctor sort by Dname, DateHired;*

(4) *select Dname, DateHired from Doctor sort by DateHired;*

(5) *select Dname, DateHired from Doctor order DateHired Asc;*

45. Consider the following incomplete entity-relationship (ER) diagram. Which of the following are the possible tables obtained if it is mapped to relations? (it can be added required attributes).
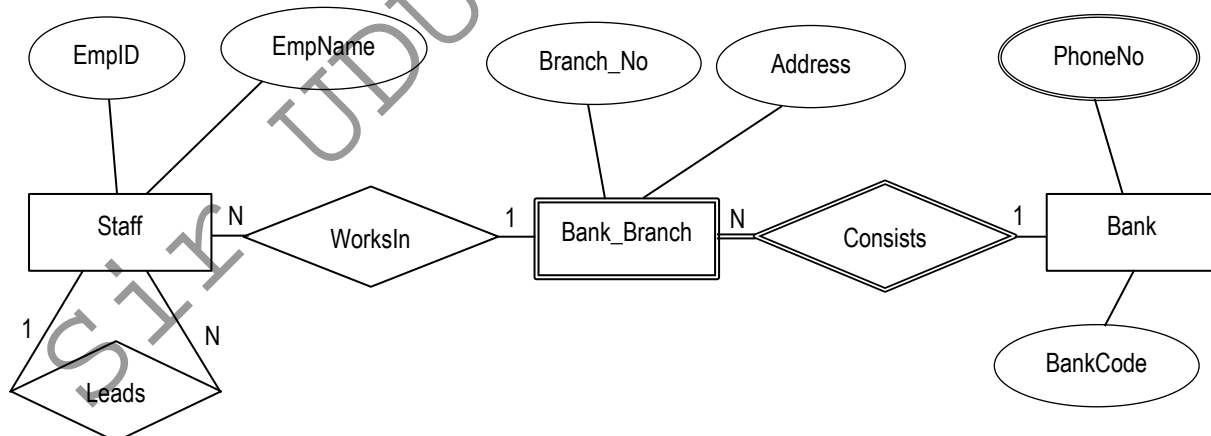
(1) Staff (EmpID, EmpName, LeaderID)
   Bank_Branch (BankCode, BranchNo, Address)
   Bank_Phone (BankCode, PhoneNo, Address)

(2) Staff (EmpID, EmpName, LeaderID, BankCode)
   Bank_Branch (BankCode, BranchNo, Address)
   Bank_Phone (BankCode, PhoneNo)

(3) Staff (EmpID, EmpName, LeaderID)
   Bank_Branch (BankCode, BranchNo, Address)
   Bank_Phone (BankCode, PhoneNo)

(4) Staff (EmpID, EmpName, LeaderID)
   Bank_Branch (BankCode, BranchNo, Address)
   Bank_Phone (BankCode)

(5) Staff (EmpID, EmpName, LeaderID)
   Bank_Branch (BranchNo, Address)
   Bank_Phone (BankCode, PhoneNo)

46. What would be the output after the python statement *print(5 | 2 ^ 3 >> 3)* is executed?
   (1) 2   (2) 7   (3) 3   (4) 1   (5) 0

47. Which of the following statements about the flowchart given below is /are correct?
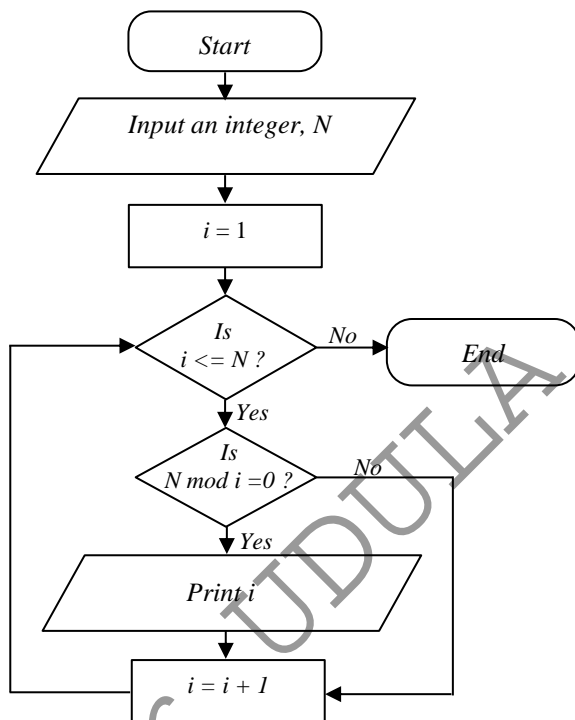
Note: Where *mod* reprents the remainder.

A - When N is given a negative number, it displays a result
B - When N is given a positive number, it stops immediately
C - 1 2 3 6 is displayed as a result when the value 6 is given to N
(1) A only   (2) B only   (3) C only   (4) A,B only   (5) A,B,C all

48. Consider the following statements about computer programming.

A - Python is an object-oriented computer programming language

B - The first and second generation computer programming languages are collectively called as "high-level programming languages"

C - Compiler translates the source code into machine code (object code) one instruction at a time

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

49. Consider the following statements.

A - Python is a third generation computer programming language

B - Variables must be declared before they can be used in a Python program.

C - First generation computer programming language is a low level computer programming language

D - Python is a high-level computer programming language

Which of the above is / are correct?

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

50. Consider the following statements about program comments / remarks.

A - They may be written once in a program

B - They are wriiten using # in all computer programming languages

C - They are written to describe programs

D - They must be written in the first line of the program

Which of the above is / are correct?

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

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National Field Work Center (FWC) தேசிய வெளிக்கள நிலையம் National Field Work Center (FWC) தேசிய வெளிக்கள நிலையம் National Field Work Center (FWC) தேசிய வெளிக்கள நிலையம் National Field Work **National Field Work Center,** Center (FWC) தேசிய வெளிக்கள நிலையம் National Field Work Center (FWC) தேசிய வெளிக்கள நிலையம் National Field Work Center (FWC) தேசிய **Conducting** National Field Work Center (FWC) தேசிய

G.C.E. (Advanced Level) Examination – 2023 July, Term - 4

Information & Communication Technology [ICT]

தகவல், தொடர்பாடல் தொழினுட்பவியல் **II** **Information & Communication Technology II**	**20**	**E**	**II**

மூன்று மணித்தியாலம்
Three hours

மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time *- 10 minutes*

Use the additional reading time to read the question paper and select and organize questions to prioritize when writing the answer.

Index No. : …………………………………….

- ❖ This paper comprises of two parts **A and B.** The time allotted for the **two parts** is **three hours only**. Additional Reading time – 10 minutes.
- ❖ Use of calculators is **not** allowed**.**

❑ **Part A – Structured Essay**
- ❖ Answer **all** the questions on the question paper itself.
- ❖ Write your answers in the space provided for each question.
- ❖ Please note that the space provided is sufficient for the answer and extensive answers are not expected.

❑ **Part B – Essay**
- ❖ This part consists of **five** questions. Answer **four** questions only. Use the papers supplied for this purpose.
- ❖ At the end of the time allotted for this paper, tie the **two papers together** so that **Part A** is **on top** of **Part B** and hand them over to the Supervisor.
- ❖ You are permitted to remove **only Part B** of the question paper from the Examination Hall.

For Examiner's Use Only		
Part	**Question No.**	**Marks**
A	**1**	
	2	
	3	
	4	
B	**5**	
	6	
	7	
	8	
	9	
Total		
Percentage		

Final Marks

In numbers	
In words	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Checked by	
Supervised by	

Part A – Structured Essay

*Answer **all four** questions on this **paper itself**.*

1.

(a) Calculate $-12_{10}+23_{10}$ using of two's complement method.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

[2 marks]

(b) Consider the following logic circuit.
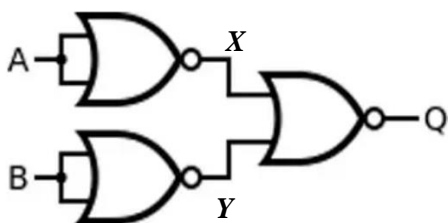
(i) Fill in the columns of the following truth table as appropriate for the above logic circuit.

A	B	X	Y	Q
0	0			
0	1			
1	0			
1	1			

[3 marks]

(ii) Which basic logic gate is equivalent to the above logic circuit?

…………………………………………………………………………………………………

[1 marks]

(c) Fill in the blanks appropriately in the table below.

OSI model	TCP/IP model
Application layer	F
A	
B	
C	G
Network layer	H
D	
E	Network access layer

A …………………………………………..

B …………………………………………..

C …………………………………………..

D …………………………………………..

E …………………………………………..

F …………………………………………..

G …………………………………………..

H …………………………………………..

[4 marks]

2.

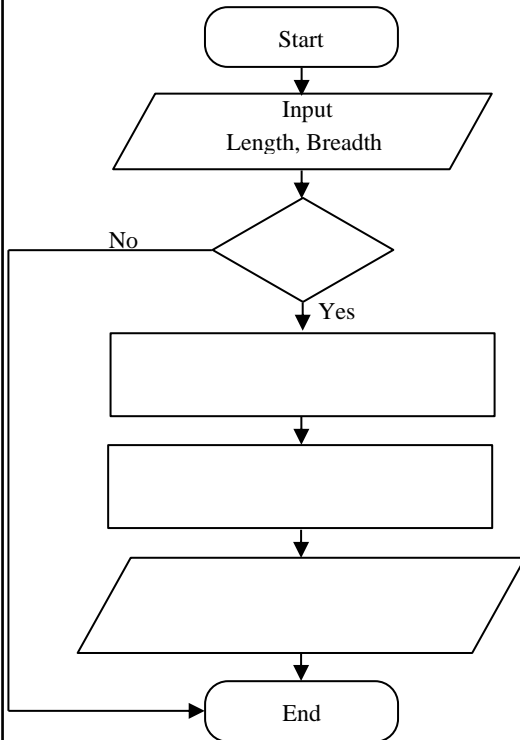**(a)** Consider the following incomplete flowchart which can be used to find the area and perimeter of a rectangle by inserting the breadth and length. The flowchart should stop when the input values for the breadth and length are 0 or negative.

Area = Length X Breadth, Perimeter = 2 X (Length + Breadth)

Fill in the flowchart blanks in a suitable way.

[4 marks]

```
                    ( Start )
                       |
                       v
              / Input          /
             / Length, Breadth /
                       |
                       v
      No  <----  < diamond >
                       | Yes
                       v
              [                 ]
                       |
                       v
              [                 ]
                       |
                       v
             /                 /
            /                 /
                       |
                       v
                   ( End )
```

(b) Briefly explain the term variable in relation to computer program.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

[3 marks]

(c) In the following table, state whether or not the strings given in column A can be used as valid variable names in a Python program. (Write in column B "yes" if valid variable, "no" if invalid).

	Column A	Column B
(i)	ab	
(ii)	A B	
(iii)	A\$b	
(iv)	_a_b	
(v)	a2b	
(vi)	if	

[3 marks]

3.

(a) Write one major difference between black box testing and white box testing.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

[2 marks]

(b) Write down one advantage of custom software.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

[1.5 marks]

(c) Fill in the blanks appropriately using the words and phrases given in the list below (just write the appropriate digits).

(i) The definitions and goals of the system's services are developed during………………………… in consultation with the users

(ii) ……………………………… methodology translates requirements into a software representation that can be implemented using software tools.

(iii) ………………………….. is understood as a software design that creates a set of programs.

(iv) …………………………… ensures that the system functions properly and meets specific user requirements.

(v) In the case of ………………………………….. the errors in the system should be corrected and the system should be modified and optimized according to the new user requirements.

Lists : [① - Maintenance, ② - Implementation, ③ - Requirement analysis, ④ - Tesing, ⑤ - Design]

[2.5 marks]

(d) Write in the spaces the system deployment strategies for the senarios given below.

(i) A medical system that monitors the patient's heart rate is implemented while the old system is still running. Both systems are used side by side for a period of time to ensure that the new system generates the same data as the old system …………………………….

(ii) A bakery operates a computerized system for customers to order products in real time. They are asked to select 25 customers to try the new system and provide adequate feedback on the system. This allows thousands of users to detect and resolve bakery issues before the system is deployed ……………………………………….

(iii) A school has a new system for managing students' athletics. The old system was a manual system. Slowly over time a new computer system is introduced to manage student sports teams and their coaches details. First the new system is developed to manage students and then it is developed to manage sports teams. Next is managing the coaches. Finally, this new system governs everything related to athletics ………………………………………..

(iv) A shop is implementing a new computer system to provide its employees with suggestions for improvement. Currently neither system is in use. Because they are sure that this new system will work better ………………………………….

[4 marks]

4.

(a) Write down two advantages of database normalization.

………………………………………………………………………………………………

………………………………………………………………………………………………

[2 marks]

(b) Consider the following scenario.

A company uses the table below to maintain details of its projects. Each project is attached to a department and is conducted for a specific period of time (months). The primary key of the table is (projnbr, deptnbr).

projnbr	deptnbr	projname	deptname	duration
P01	D03	Web Portal	HR	10
P01	D07	Web Portal	Sales	10
P02	D07	Data Warehouse	Sales	7
P02	D03	Data Warehouse	HR	7

(i) Give an example for update anomaly that may occur in this table.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

[1 marks]

(ii) Explain what is meant by partial dependency in relation to this table.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

[2 marks]
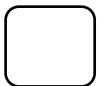
(iii) After removing the partial dependencies, convert this table to the next normal form.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

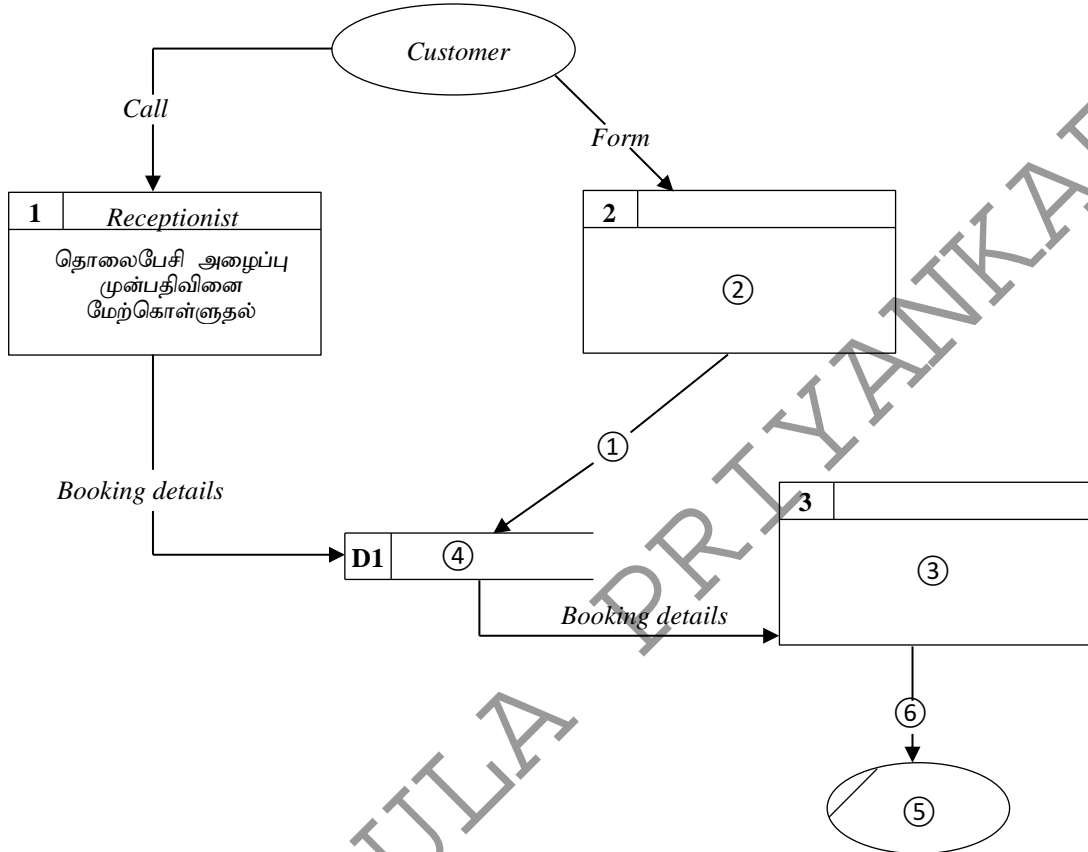**[2 marks]**

(c) Consider the following incomplete level 1 data flow diagram (DFD).

A customer makes a phone call to a company that rents out rooms. The receptionist will answer it. It is checked in the system whether the booking details have already done. Bookings will be made if a room is available. Further, customers may also fill the web-based booking form on the company's website. When bookings are submitted it is processed to check its availability. If the room is available, it is booked in advance. A confirmation letter will be generated and sent to the customer if the booking has been made.

Fill in the blanks using suitable phrases.

① ……..………………………………….

② ……………………………………….

③ ……………………………………….

④ ……………………………………….

⑤ ……………………………………….

⑥ ……………………………………….   **[3 marks]**

∗∗

National Field Work Center,
Conducting
G.C.E. (Advanced Level) Examination – 2023 July, Term - 4

Information & Communication Technology [ICT]

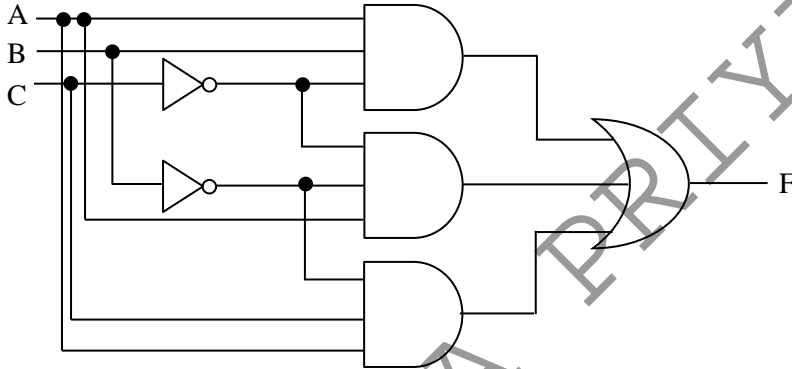| தகவல், தொடர்பாடல் தொழினுட்பவியல் **II**
Information & Communication Technology II | **20** | **E** | **II** |

Part B

✳ *Answer any **four** questions only.*

(5) Consider the following logic circuit.

(a) Write the Boolean expression for the output F.
(b) Prepare the truth table for the Boolean expression in **(a)**.
(c) Get a simplified expression for F using Karnaugh map.
(d) Using only NAND gates draw a logic circuit for F.

[3+4+4+4=15 marks]

(6)

(a)

   (i)   What is the major function of DHCP server?
   (ii) What is the major function of DNS server?
   (iii) Write down two major functions of router.

(b) Consider the following scenario.

A medium sized garment factory has LANs for each departments such as Business Information System, Accounting, Production, and Marketing. The table given below shows the number of machines in each department.

[see page eight

Departments	Number of computers in each department.	Number network printers in each department
Business Information System	19	2
Accounting	17	1
Production	10	1
Marketing	22	2

The network administrator has been provided with an IP block, 192.146.1.0/24. The network administrator should assign IP addresses to each node in each department. Four subnets are to be made for this purpose, moreover, This network is connected to a public IP address to provide the employees with Internet connectivity. All the departments are situated in different buildings within the same area. A firewall is implemented to protect the network, furthermore, the network administrator is provided with 4 switches, suffiecient amount of network cables, a proxy server and a DHCP server. The Business Information System has been directly connected to the Internet.

Draw the logical arrangement of the given situation. Show all the IP addresses, Network devices and servers clearly.

Use the following table to allocate IP addresses (use only VLSM).

Departments	Network address	Broadcast address	Subnet mask	Usable IP address range
Business Information System				
Accounting				
Production				
Marketing				

[6+9=15 marks]

(7)

(a) Consider the following scenario.

Vehicle spare parts are manufactured by manufacturers. A manufacturer may produce more than one spare part. Customers can also issue orders for spare parts. A customer can issue more than one order. More than one spare part may appear in orders placed by customers and a particular spare part may be present in more than one order. The order is subject to customer existence.

Each of the following data needs to be stored for this.

- Names and addresses of manufacturers (address consists of city, street)
- Spare part number and description of spare parts
- Customer number and name
- Order number
- Each of the order has different quantity of spare parts

Draw the entity-relationship diagram for the given scenario. If any assumptions are used, state them clearly.

[6 marks]

(b) The following data table shows the details of employees of a company.

Employees

EmployeeNo	DepartmentNo	EmployeeName	Department
1	101	Amith	HR
2	102	Divya	IT
3	101	Rama	HR

(i) Justify with appropriate reasons which normal form the above table is in.

(ii) Convert the table given above to next normal form. Write down the tables in the form of schema.

[2+3=5 marks]

(c) Consider the following 'Persons' data table.

PersonID	FirstName	LastName	City
P001	John	Joe	Colombo
P002	Perera	Silva	Galle
P003	Jamuna	Sivarasa	Jaffna
P004	Hakeem	Aslum	Kandy
P005	Vimali	Nathan	Jaffna

(i) Write down SQL statement to remove the record of a person 'P003' from the table.

(ii) Write down the output if the SQL statement *select PersonID,FirstName,City from Persons where City= 'Jaffna';* is applied to this table?
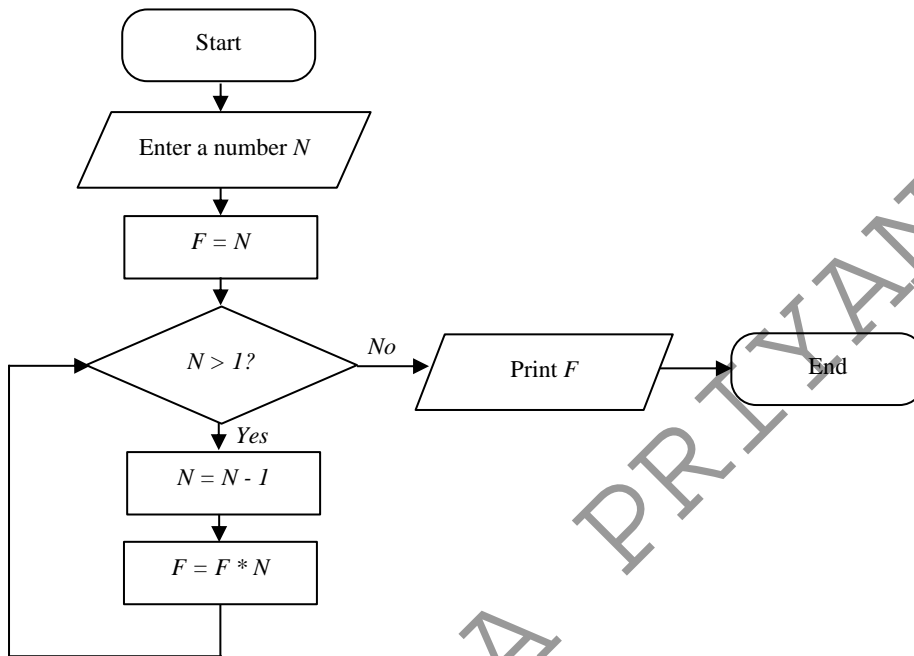
[2+2=4 marks]

(8)

(a) A particular number of subject marks (consider as N) is input by the user, among them only those that are 100 or less than 100 should be displayed as the output. Draw the flowchart for this.

[6 marks]

(b) Consider the following flowchart that represents an algorithm.

(i) What will be the output of this flowchart if the value 5 is entered by the user?

(ii) Write down the purpose of this algorithm.

[2+3=5 marks]

(c) Briefly explain why the program translators are needed to execute the programs written in high level computer programming languages.

[4 marks]

(9)
(a)

(i) Briefly explain two reasons of why the system maintenance is needed during the last stage of software development.

(ii) Briefly explain what user acceptance testing is, and by who it is done.

[2+2=4 marks]

(b) Consider a computer which has virtual addresses of 16-bits from 0 to 64K. The physical memory size of this computer is 32KB. Assume that the size of a page is 4 KB.

(i) What is the number of bits needed to store a page number?

(ii) What is the number of bits needed to store a frame number?

(iii) What is the number of bits of the offset of the virtual memory?

[2+2+2=6 marks]

(c) Write down an advantage and a disadvantage of the contiguous space allocation technique used in an operating system.

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

[3+2=5 marks]

***