AL/2024/20/E-I

National Field Work Center,
Conducting
G.C.E. (Advanced Level) Examination - 2024 , Term - 5

Information & Communication Technology [ICT]

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

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.*

Part - I

1. Which of the following is **not** an application software?

(1) Graphics software

(2) Operating system software

(3) Word processing software

(4) Spreadsheet software

(5) Accounting software

2. Consider the following statements.

A - Creating data

B - Data management

C - Data processing

D - Removing obsolete data

Which of the above is / are the **stage(s)** of data life cycle?

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

3. Which of the following is the best example for **batch processing**?

(1) Payroll system

(2) Tsunami early warning system

(3) Flight control system

(4) Atomic energy control system

(5) Driverless automatic car control system

4. Which of the following is **not** a component of computer system?

(1) Firmware   (2) Liveware   (3) Malware

(4) Software   (5) Hardware

5. Consider the following statements.

A - CRT display is a vacuum tube containing one or more electron guns, which emit electron beams that are manipulated to display images on a phosphorescent screen.

B - LCD display is a flat-panel display that uses the light-modulating properties of liquid crystals combined with polarizers.

C - LED display is a flat panel display that uses an array of light-emitting diodes as pixels for a video display.

Which of the above is / are **correct**?

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

6. "…………….. means that a human-computer interface in which a portable computer in normal use that allows the transmission of data such as voice and video".

Which of the following is **suitable** for filling the blank?

(1) Internet
(2) Mobile computing
(3) World wide web
(4) Plagiarism
(5) Digital divide

7. Consider the folowing paragraph about computer memories.

Computer memory is broadly classified into primary and secondary memory …….①…… includes Random Access Memory and Read-Only Memory ……②…… is volatile, meaning it loses its data when the power is turned off, and is used for temporary storage while the computer is running …….③…… is non-volatile and retains its contents even when the power is off. Secondary memory includes storage devices like hard drives, solid-state drives, and optical disks, which provide long-term data storage. Unlike primary memory, secondary memory is …….④……. and used for permanently storing data and programs.

Which of the following is **correct**?

(1) ①- Primary memory,②- Random Access Memory,③- Read-Only Memory,④- Volatile
(2) ①- Read-Only Memory,②- Random Access Memory,③- Primary memory,④- Non-volatile
(3) ①- Primary memory,②- Read-Only Memory,③- Random Access Memory,④- Volatile
(4) ①- Primary memory,②- Random Access Memory,③- Read-Only Memory,④- Non-volatile
(5) ①- Primary memory,②- Read-Only Memory,③- Random Access Memory,④- Non-volatile

8. Consider the following statements about static random access memory (SRAM).

A - It is used as a technology of register
B - Its speed is lower than dynamic random access memory (DRAM) technology
C - Its density is higher than dynamic 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

9. What is the simplified result of Boolean expression $ABC + \bar{A} + A\bar{B}C$?

  (1) $\bar{A} + C$ (2) $AB + C$ (3) $\bar{C}(A\bar{B} + B)$ (4) $A\bar{C} + B$ (5) $B + A\bar{C}$
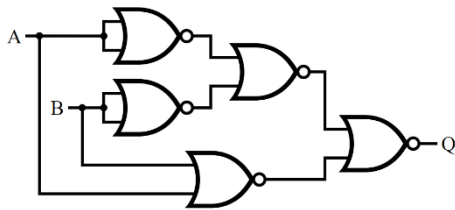
10. Consider the following Karnaugh map.

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

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

(1) $AC + \bar{A}\bar{B}$

(2) $AB + BC$

(3) $AB + \bar{A}BC$

(4) $BC + AB$

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

11. Consider the following logic circuit.

  What is the logical equivalent Q of the above logic circuit?

  (1) AND   (2) NAND   (3) XOR   (4) NOR   (5) XNOR

12. Which of the following is **equivalent** to 19.375_{10} ?

  (1) 10011.011_2 (2) 11011.011_2 (3) 10011.101_2 (4) 10011.001_2 (5) 11101.011_2

13. What is the result of **XOR** operation of 10101010_2 and 11010111_2 ?

  (1) 10111101_2 (2) 00111101_2 (3) 01111100_2 (4) 01100101_2 (5) 01111101_2

14. Consider the following Boolean results.

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

Q - $(A + B)(A + C) = A + BC$

R - $A.(B + C) = A.B + A.C$

S - $A + \bar{A}B = A + B$

Which of the above is / are **correct**?

  (1) P only   (2) Q only   (3) P,R only   (4) Q,R,S only   (5) P,Q,R,S all

15. The operating system uses various ways to make space allocations for files.
Among them "…………………………..creates a table of indices (pointer) at the time of file creation".

Which of the following is **suitable** for filling the blank?

  (1) Linked allocation

  (2) Memory allocation

  (3) Contiguous allocation

  (4) Indexed allocation

  (5) Software allocation

16. Consider the following table about operating system.

	X		**Y**
(i)	Involves moving entire processes back and forth between disk and RAM.	**(a)**	Page table
(ii)	Keeps track of where the various pages of a process's virtual address space reside in physical memory.	**(b)**	Context switch
(iii)	Occurs when a program tries to access a page that is not currently mapped to physical memory, prompting the OS to retrieve the page from disk.	**(c)**	Swapping
(iv)	the process by which a computer's operating system (OS) saves the state of an active process, so that it can be restored and execution resumed at a later point.	**(d)**	Thrashing
(v)	Happens when a system spends more time swapping pages in and out of memory than executing processes.	**(e)**	Page fault

Which of the following **correctly** matches the above table?

(1) (i)-(d), (ii)-(a), (iii)-(e), (iv)-(b), (v)-(c)   (2) (i)-(a), (ii)-(c), (iii)-(e), (iv)-(b), (v)-(d)

(3) (i)-(c), (ii)-(a), (iii)-(e), (iv)-(d), (v)-(b)   (4) (i)-(c), (ii)-(a), (iii)-(e), (iv)-(b), (v)-(d)

(5) (i)-(c), (ii)-(d), (iii)-(e), (iv)-(b), (v)-(a)

17. Which of the following **cannot be considered** as a state of process transition diagram in an operating system?

(1) Ready

(2) Exit

(3) Queue

(4) Waiting

(5) Running

18. In the following, consider the steps in the process of swapping of the operating system.

A - Restoring the process state

B - Saving the process state

C - Identifying the process

D - Resuming execution

E - Freeing up memory

Which of the following is the correct order of these steps?

(1) ① → C, ② → B, ③ → E, ④ → A, ⑤ → D

(2) ① → D, ② → B, ③ → E, ④ → A, ⑤ → C

(3) ① → B, ② → C, ③ → E, ④ → A, ⑤ → D

(4) ① → C, ② → B, ③ → D, ④ → A, ⑤ → E

(5) ① → A, ② → E, ③ → B, ④ → C, ⑤ → D

19. Which of the following(s) is / are correct about schedulers of an operating system?

A - Long-term scheduler determines which of the ready (in-memory) processes will be executed by the CPU next.

B - The primary goal of medium-term scheduler is to improve system performance by making decisions about which processes should be swapped in and out of the main memory.

C - Short-term scheduler determines which processes are allowed to enter the system and be loaded into the ready queue for execution.

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

20. Which of the following is not in a page table entry of an operating system?

(1) Valid bit

(2) Frame number

(3) Access bit

(4) Bus bit

(5) Protection bit

21. Consider the following statements.

A - uses a flow control mechanism to prevent the sender from overwhelming the receiver with too much data at once.

B - establishes a connection between the sender and receiver before data transmission begins.

C - ensures that all data sent by the sender is received by the receiver correctly and in the same order.

D - has a simple header with minimal overhead, making it faster and more efficient for certain applications.

Which of the above is / are **correct** about transmission control protocol (TCP)?

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

22. Consider the following paragraph with blanks.

……**A**……. is a unique identifier assigned to a network interface card by the manufacturer, It consists of ……**B**……. and operates at the ……**C**…….. of the OSI model. It ensures that data packets are delivered to the correct physical device within a local area network. ………**D**……… operates at the Network Layer and is used to identify devices and route data across different networks. IP addresses can be either ………**E**……. These addresses can be dynamic, assigned by a DHCP server or manually.

Which of the following is **correct** to fill the spaces **A, B, C, D, E** respectively in the above paragraph?

(1) A - MAC, B - 48 bits, C - data link, D - IP, E - 32 or 128 bits

(2) A - IP, B - 48 bits, C - data link, D - MAC, E - 32 or 128 bits

(3) A - MAC, B - 48 bits, C - network, D - IP, E - 32 or 128 bits

(4) A - MAC, B - 48 bits, C - transport, D - IP, E - 32 or 128 bits

(5) A - IP, B - 32 or 128 bits, C - data link, D - MAC, E - 48 bits

23. Consider the following statements about proxy server.

A - It is considered as an intermediary server between client and the Internet
B - It maps domain name into corresponding IP address
C - It fasten the service by process of retrieving content from the cache which was saved when previous request was made by the client
D - It allows to hide, conceal and make network user anonymous by hiding user's IP address.

Which of the above is / are **correct** statements?
(1) A,B only   (2) A,C only   (3) B,D only   (4) D,E only   (5) A,C,D only

24. Which of the following is a private IP address?
(1) 8.8.8.8   (2) 172.17.1.4   (3) 11.16.1.2   (4) 172.35.0.1   (5) 191.168.1.1

25. A cable consists of a copper wire in the middle surrounded by isolation material which in turn is surrounded by a braided outer conductor. All these are encased in a protective plastic covering running along the cable.
What is the **type of this cable**?
(1) Fiber optic cable
(2) Coaxial cable
(3) UTP cable
(4) STP cable
(5) A cable used for domestic wiring

26. Which of the following would be the **functional** requirements of a system which allow online shopping for customers?
(1) The system should be fast enough to work without delaying the business process.
(2) The system shall be able to respond 1000 transactions in a second.
(3) User interface of the system should be easy for customers to operate without any confusion.
(4) System should provide the total value of the shopping cart at the time of check-out.
(5) System should be available 24 x 7 for all customers.

27. Which of the following is/are **not true** with regard to the waterfall model?
A - It is more suitable for projects that have unclear requirements.
B - It allows clients to provide their feedback during system development.
C - It plans and schedules all the process activities before starting software development.
D - It is an old method that is not popular and not used now.
(1) A,B only   (2) C,D only   (3) A,C only   (4) A,B,D only   (5) A,B,C,D all

28. What is the correct execution order of the following test types?
(1) Unit Testing, Integration Testing, Acceptance Testing, System Testing
(2) Unit Testing, Integration Testing, System Testing, Acceptance Testing
(3) Integration Testing, Unit Testing, Acceptance Testing, System Testing
(4) Integration Testing, Unit Testing, System Testing, Acceptance Testing
(5) System Testing, Unit Testing, Integration Testing, Acceptance Testing

29. Which of the following is/are **correct** about custom software?

A -They are developed to satisfy the needs of particular customers

B - In comparison to COTS packages, users can use most of its features

C - They are less costly in comparison to COTS packages

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

30. Consider the following table.

	Information Systems		**Description**
(i)	Enterprise Resource Planning system	**(a)**	It is a sysetm of thinking logically using knowledge to provide solutions to complex problems
(ii)	Transaction Processing System	**(b)**	It is a suite of integrated applications used by organizations to manage their business processes. This automates and integrates core business processes, such as finance, HR, manufacturing, supply chain, services, procurement, and others.
(iii)	Expert system	**(c)**	It is an information system that collects, stores, modifies, and retrieves the data transactions of an enterprise. This system is essential for the daily operations of businesses, providing the foundation for many business processes.

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

(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)

31. Consider the following statements about mapping many-to-many (M: N) binary relationships in an Entity Relationship Diagram (ERD) to a set of relations.

A - A new relation will be created and primary keys of the entities will be copied to the new relation to act as foreign keys.

B - Attributes of the relationship will be dropped.

C - A new relation will be created and primary keys of the entities will be combined to create the primary key in the new relation.

Which of the following statements is/are correct?

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

32. Which of the following commands is in the Data Definition Language (DDL)?

(1) CREATE   (2) SELECT   (3) GRANT   (4) REVOKE   (5) UPDATE

33. Which of the following(s) statement(s) is /are **correct** regarding **foreign keys**?

A - A foreign key is a set of attributes in one relation that corresponds to a primary key in another relation.

B - Foreign keys are needed to logically link data in one relation with data in another relation.

C - A foreign key attribute needs to have the same name as the primary key attribute to which it corresponds.

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

34. Consider the following ER diagram, which depicts the relationships between an Employee and the Projects she/he may lead.
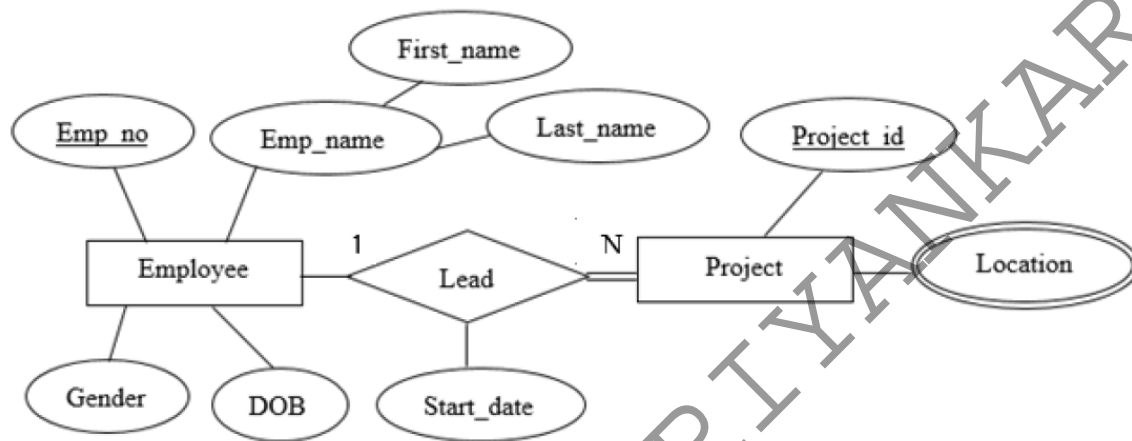
It is required to map the ER diagram into the necessary **relations**. Which of the following should be the relations of the above ER diagram when mapped into the necessary relations?

(1) Employee (Emp_no, Gender, DOB, First_name, Last_name)
(2) Employee (Emp_no, Gender, DOB, First_name, Last_name, Project_id)
(3) Project (Project_id, Leader, Start_Date)
(4) Project (Project_id, Leader, Start_Date, Location)
(5) Lead (Emp_no, Project_id, Start_Date)

35. Consider the relation Inventory (PartNo, Warehouse, Location, Quantity, Weight, Colour) with the following functional dependencies.

FD1 : PartNo → Weight, Colour
FD2 : (PartNo, Warehouse) → Quantity
FD3 : Warehouse → Location

Where FD1, FD2, FD3 - Functional dependencies.

Which of the following statement is **correct**?
(1) Functional dependency FD1 violates 2 NF.
(2) Functional dependency FD2 violates 1 NF.
(3) Functional dependency FD3 violates 3 NF.
(4) The best normal form of Inventory satisfies 3 NF.
(5) The best normal form of Inventory satisfies 2 NF.

To answer questions **(36)** and **(37)**, consider two relations Employee and Department extracted from the company's database. In relation to the Employee, EID is the primary key and Dept_No is the foreign key of the department relation.

Employee Table

EID	Name	Address	Designation	Dept_No	Salary
123456	Janith Perera	23,Hill side, Nuwara Eliya	Merchandizer	2	90000
123236	Raseeth Riyas	Nawala, Rajagiriya	Manager	1	150000
123746	Sanduni Alwis	Saman Villa, Colombo 4	Clerk	3	60000
123886	Ragu Balachandran	College Road, Jaffna	Manager	2	150000

Department Table

Dnumber	DName
1	Winter Wear
2	Sport Wear
3	Shoes

36. Assume that the management of the company decided to give a 'Festive_Bonus' during the month of April.

Festive_Bonus = Salary + Salary * 0.5

Which of the following SQL statements can be used to list down the Name and the Festive_Bonus given for each employee?

(1) SELECT Name, Salary + Salary * 0.5 AS Festive_Bonus FROM Employee;

(2) SELECT Name, Festive_Bonus AS Salary+Salary*0.5 FROM Employee;

(3) CREATE Festive_Bonus = Salary + Salary * 0.5 FROM Employee;

(4) SELECT Name, Festive_Bonus = Salary + Salary * 0.5 FROM Employee;

(5) SELECT Name, Festive_Bonus FROM Employee WHERE Festive_Bonus = Salary+Salary*0.5;

37. Assume that you want to retrieve the names of the employees as well as the department name of all employees who have been assigned to a department. Which of the following SQL statements will produce the **correct** result?

(I) SELECT Name, DName FROM Employee LEFT OUTER JOIN Department d ON (e.Dept_No = d.Dnumber);

(II) SELECT Name, DName FROM Employee RIGHT OUTER JOIN Department d WHERE (e.Dept_No = d.Dnumber);

(III) SELECT Name, DName FROM Employee NATURAL JOIN Department d ON (e.Dept_No = d.DNumber);

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

38. Consider the following Python statements.

A - List items are ordered and changeable.

B - Tuple is an ordered and unchangeable.

C - Set is a collection which is unordered and unchangeable.

Which of the above is / are **correct**?

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

39. Consider the following Python program.

```
i=1
while i<50:
  if i%5 == 0 and i%7==0 :
    print(i, end=' ')
  i+=1
```

What will be the **output** when this program is executed?

(1) 35   (2) 7   (3) 5   (4) 21   (5) 51

40. Consider the following Python program.

```
def Nmax(list1,N):
  L1=[]
  for i in range(0,N):
    max = 0
    for j in range(len(list1)):
      if list1[j] > max:
        max = list1[j]
    L.remove(max)
    L1.append(max)
  print(L1)
L=[6,41,85,5,3,7]
N=2
Nmax(L,N)
```

What will be the **output** when this program is executed?

(1) [85]

(2) 85

(3) 85, 41

(4) 2

(5) [85, 41]

41. What will be the **output** when the following Python program is executed?

```
L=[4,7,3,2,9]
L[1]=8
L.append(5)
L.pop(2)
L.reverse()
L.sort()
print (L)
```

(1) [2, 4, 5]   (2) [9, 8, 5, 4]   (3) [2, 5, 8, 9]   (4) [2, 4, 5, 8, 9]   (5) [9, 5, 4, 1]

42. What will be the **output** of the following Python program?

```
for i in range (1,5):
  for j in range (2,6):
    if j%i == 0:
      break
  print i,j
```

	(1)	(2)	(3)	(4)	(5)
	3 2	2 3	3 2	3 2	3 2
	4 2	4 2	4 3	3 2	3 2
	4 3	4 3	4 3	4 3	3 3

43. What will be the **output** when the Pythcon statement *print (5>>2%(3**2)/2)* is executed?

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

44. Which of the following statement(s) about user defined functions in Python programming is / are **correct**?

   A - They are executed only when they are called in a program

   B - A function can be called only once

   C - When calling a function, values can be sent as parameters

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

45. What are ① and ② if the following Python program gives 5 as input and returns output as 15?

   num = int(input('Enter a number:'))   (1) sum, num

   sum = 0   (2) num, sum

   while(num > 0):   (3) sum, 1

       sum += ①   (4) num, 1

       num -= ②   (5) 1, num

   print(sum)

46. Consider the following HTML statements.

   A - HTML stands for Hyper Text Markup Language

   B - HTML describes the structure of a web page.

   C - HTML consists of a set of elements.

   D - HTML elements tell the browser how to display the content.

   Which of the above is / are **correct**?

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

47. Which of the following is **correct** HTML code to insert an image on a web page?

   (1) *<image src="image.gif" alt="tree"/>*

   (2) *<img alt="tree"> image.gif </img>*

   (3) *<image href="image.gif" alt="tree" />*

   (4) **

   (5) **

48. Consider the following statements about HTML tags.

   A -
  inserts line break.

   B - <hr> separates two contents on a web page.

   C - <a> helps to create a hyperlink.

   D - <p> inserts single line space before and after the text.

   Which of the above is / are **correct**?

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

49. Consider the HTML code segment with the following spaces for embedding a **video file** into a web page.

<**(A)** *width="320" height="240"* **(B)**>
 <**(C)** *src="movie.mp4"* **(D)** *="video/mp4">*
        Your browser does not support the video tag.
</*(A)*>

Which of the following is correct to fill the labels **(A), (B), (C)** and **(D)** respectively?

(1) embed, controls, source, type
(2) audio, controls, source, type
(3) video, type, source, controls
(4) video, source, controls, type
(5) video, controls, source, type

50. Which of the following is the group that contains **only the HTML tags** that should be used to display the following output in a web browser?

Contacts

Company	Contact	City
RK Systems	021 222 5436	Jaffna
Sys Systems	011 4256464	Colombo

(1) titles, th, tr, tc, table
(2) caption, th, tc, td, table
(3) caption, th, tr, td, table
(4) heading, th, tr, td, table
(5) titles, th, tr, td, table

*** *

National Field Work Center,
Conducting

G.C.E. (Advanced Level) Examination – 2024, Term - 5

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. : …………………………………

For Examiner's Use Only

Part	Question No.	Marks
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
Total		
Percentage		

Final Marks

In numbers	
In words	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Checked by	
Supervised by	

- ❖ 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 **six** 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.

Part A – Structured Essay
*Answer **all four** questions on this **paper itself**.*

1.

(a)

(i) The HTML code to get the following result on a web browser is given below. Fill in the blanks with **suitable** words.

Coffee
    Black hot drink
Milk
    White cold drink

    <………>
     <dt> <……..> Coffee </…......> </dt>
     <dd> <……...> Black hot drink </……..> </dd>
     <dt> <……...> Milk </………> </dt>
     <dd> <………> White cold drink </……...> </dd>
    </……...>

(ii) Consider the following webpage.

```
Enter details:
First name:
[                    ]
Last name:
[                    ]

Choose gender:
(●) Male
( ) Female

[ Submit ]
```

The HTML code for the above webpage is given below. Fill in the blanks with **suitable** words.

<html>
<head>
    <title> Application </title>
</head>
<body>
<form method="post" action="">
<……….…….>
<…………….> Enter details: </……………..>

 *<label for="fname">First name:</label>
*
 *<input type="……………." id="fname" name="fname">
*

 *<label for="lname">Last name:</label>
*
 *<input type="……………." id="lname" name="lname">

*

*Choose gender:
*

<input type=".................." id="male" name="gender" value="male" ....>

*<label for="male"> Male </label>
*

<input type=".................." id="female" name="gender" value="female">

*<label for="female"> Female </label>

*

<input type="...................." name="sbt" value="Submit">

</...............>

</form>

</body>

(b) Write the **output** of the following HTML code in the box (assume that it is a web browser) provided below.

<body>
<table border="1">
<caption> Contact Details </caption>
 <tr>
  <th> Company </th>
  <th colspan="2"> Contacts </th>
 </tr>
 <tr>
  <td> K Systems </td>
  <td> 021 222 6575 </td>
  <td> 011 337 3774 </td>
 </tr>
 <tr>
  <td> Lin Systems </td>
  <td> 021 221 7447 </td>
  <td> 011 443 5556 </td>
 </tr>
 <tr>
  <td> Base </td>
  <td> 021 222 4454 </td>
  <td> 011 444 6653 </td>
 </tr>
</table>
</body>

(c) State each of the following HTML code elements as **true** if correct and **false** if incorrect.

   (i) * Visit *

     (…………………)

   (ii) *<iframe src="demo.html" height="200" width="300" title="ex"> </iframe>*

     (…………………)

   (iii) *<input type="email" id="email" name="email">*

     (…………………)

   (iv) *<input type="image" src="img.gif" alt="Submit" width="48" height="48">*

     (…………………)

2.

(a) Consider the following incomplete flowchart for inputting the length (L) and breadth (B) of a rectangle and displaying its area (A) and perimeter (P). The flowchart should stop when length and breadth are **zero or negative** values.

Area of rectangle = Length X Breadth

Perimeter of rectangle = 2 X (Length + Breadth)
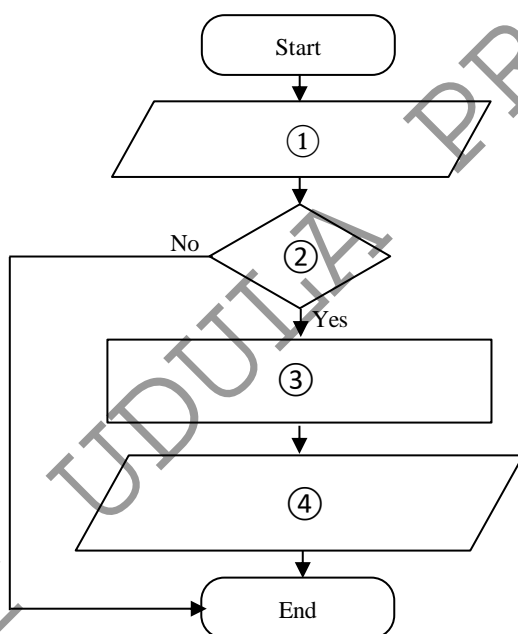
Fill in the blanks in the flowchart as appropriate in the following spaces.

① ………………………………   ② ………………………………

③ ………………………………   ④ ………………………………

(b) Write down the **output** of the following Python program.

```
s = 'machines learnings'
i = 0
while True:
    print(s[i],end='')
    if s[i] == 'e' or s[i] == 's':
        break
    i += 1
```

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

(c) Consider the following Python program to obtain sum of some square numbers.

```
def squaresum(n):
    sm = 0
    for i in range(1, n+1):
        sm=sm+……………..
    return …………………
n=4
print(squaresum(n))
```

Fill in the **blanks** suitably in the program.

(d) Write two **characteristics** of low level computer programming languages as compared to high
level computer programming languages.

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

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

3.

(a) Fill in the blanks using the **list** given below.

Encryption and decryption are essential processes for securing digital information, where

encryption converts …………………… into ……………….. using ……………….. and

…………………….., and decryption reverses the process to restore the original data. There are

two primary types of encryption: Symmetric and asymmetric. Symmetric encryption uses the

……………………. for both encryption and decryption, requiring ………………… between

parties. Asymmetric encryption, or public-key encryption, uses a ………………….... These

encryption types are widely used to protect sensitive communications, secure online

transactions, and ensure data privacy and regulatory compliance.

Lists: {Same key, plain text, algorithms, keys, secure key sharing, ciphertext, pair of keys}

(b) The three-way handshake is a process used in TCP/IP networks to establish a connection between a client and a server. It ensures that both parties are ready to communicate and can synchronize their data transmission.

In the following figure, find and write the **appropriate words** as usual symbols for A, B and C from the list given below.
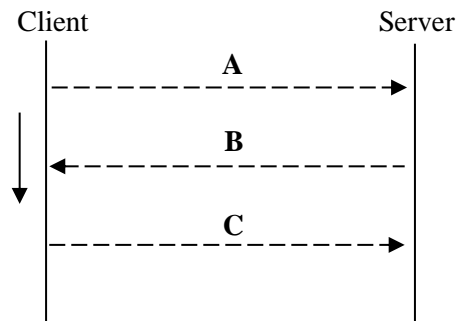
Lists: {ACK, SYN, SYN-ACK, SEQ}

(c) Write the appropriate words from the **list** given below in the following spaces.

(i) A ………………… is a network security device or software that monitors and controls incoming and outgoing network traffic based on predetermined security rules.

(ii) A ………………… acts as an intermediary between a client such as a web browser and a server such as a web server. When a client requests a resource from a server, the request first goes to the proxy server, which then forwards the request to the actual server. The server sends the response back to the proxy, which in turn sends it to the client.

(iii) ………………….. is a method used to digitally represent analog signals. It is widely used due to its simplicity and effectiveness in converting analog signals to digital form.

(iv) …………………... is a technique used in telecommunications and computer networks to combine multiple signals or data streams into one. This allows several communication streams to share a single physical medium.

(v) …………………… refers to the reduction in the strength or amplitude of a signal as it travels through a medium. It affects the quality and reliability of the transmitted signal.

(vi) …………………… is a technique used in data communication to manage the rate of data transmission between two nodes, ensuring that the sender does not overwhelm the receiver with too much data too quickly.

Lists : [PCM, Flow control, Proxy server, Bandwidth, ADSL, Attenuation, Firewall, Multiplexing, Parity bit]

(d) If computer A sends the data 1010101. An even parity method is used to detect error,

(i) What is the **parity bit**? Give reason.

....

....

(ii) Give one **constraint** of parity bit method in detecting error.

....

....

4.

(a) Consider the following *Orders* table.

Orders

OrderID	ProductID	ProductName	Quantity	CustomerID	CustomerName
1	101	Widget	4	1001	John Doe
2	102	Gizmo	3	1002	Jane Smith
3	101	Widget	2	1003	Bob Johnson

(i) In **which normal form** is the above table? Give a reason.

....

....

....

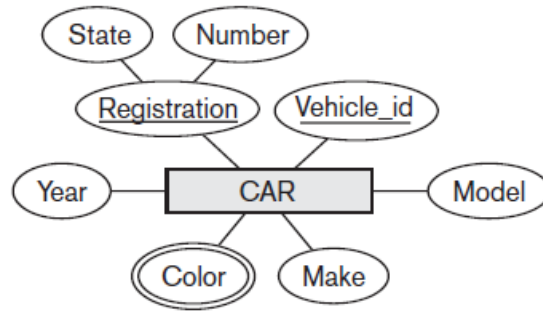**(ii)** Convert the table given above into **next normal** form. Give the tables in the form of schema.

....

....

....

....

(iii) Give two **advantages** of a normalized data table.

....

....

....
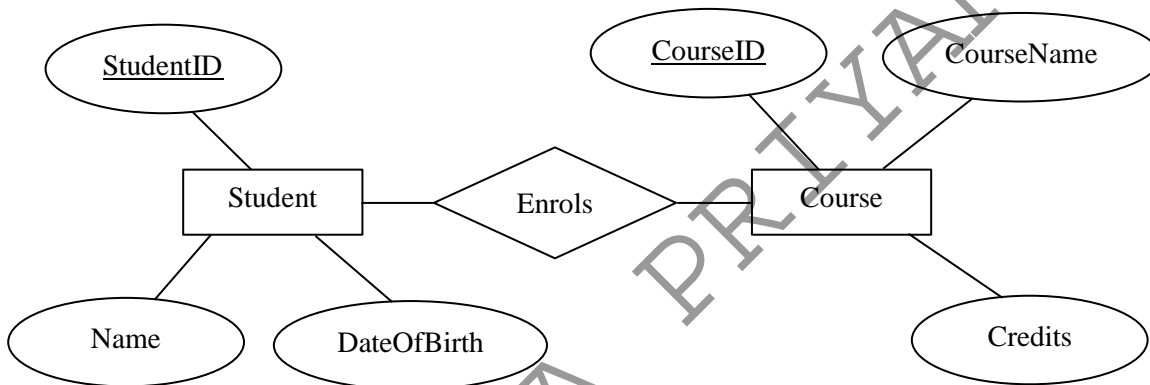
(b) Consider the following CAR entity and its attributes.

Write the **types** of the following attributes in the spaces given below.

(i) Color ………………………………………………………………..

(ii) Vehicle_id ………………………………………………………………..

(iii) Registration ………………………………………………………………..

(c) Consider the following ER diagram.

Students can enroll in multiple courses and each course can have multiple students enrolled.

(i) Write the **cardinality** between the student and course entities relationship. Justify your answer.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

(ii) Give the **resulting data tables** in the form of schema if the ER diagram is mapped into tables.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

(iii) Write down the **definition** of primary key.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

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National Field Work Center,
Conducting
G.C.E. (Advanced Level) Examination – 2024 , Term - 5

Information & Communication Technology [ICT]

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

Part B

※ Answer any **four** questions only

(5)

(a) Consider the following Karnaugh map.

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

  (i) Obtain a simplified Boolean expression in the form of sum of products (**SOP**) using the Karnaugh map. Show the loops clearly in the Karnaugh map.

  (ii) Construct a logic circuit corresponding to the simplified Boolean expression in **(i)** above using only **NAND** gates.

  (iii) Obtain a simplified Boolean expression in the form of product of sums (**POS**) using the Karnaugh map. Show the loops clearly in the Karnaugh map.

  (iv) Construct a logic circuit corresponding to the simplified Boolean expression in **(iii)** above using only **NOR** gates.

(b) Consider the following logic circuit consisting of only NAND logic gates.
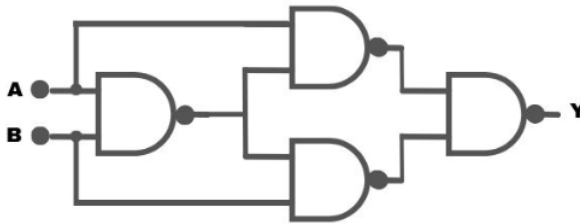
  (i) Derive the **output Y** of the logic circuit in the **simplified** form given above.
  (ii) Construct **truth table** for the simplified Boolean expression.
  (iii) Which is the **single logic gate** equivalent to the output **Y**?

(6)

(a)

(i) Write down any two **advantages** of subnetting a computer network.

(ii) Write down two **functions** of the transport layer of the OSI network reference model.

(iii) Give two **disadvantages** of star topology compared to bus topology.

(b) Assume a network administrator has the IP address block 192.112.4.65/26. The four subnets are to be created such as Marketing (10 computers), Production (11 computers), Finance C (9 computers), HRM (12 computers).

(i) Write the **subnet mask** of the above IP address block in dotted decimal notation.

(ii) Write down the number of host bits required to create the specified **number of subnets**.

(iii) After subnetting, **complete** the table as shown below.

Subnet	Network Address	First usable IP address	Last usable IP address	Broadcast Address
Marketing				
Production				
Finance				
HRM				

(c) Write down two **differences** between the protocols such as TCP and UDP.

(d) Give the layers of the OSI model in order and the **form** (data encapsulation) in which the data is found in them.

(7)

(a) The size of a block in a disk is 4KB. Below is a portion of a file allocation table (FAT). Also it contains the blocks of the file *sports.docs*. Here the last block of the file is denoted by -1 and the file's directory entry contains the block number of the first block of the file.

220	**224**
221	
222	**-1**
223	**222**
224	**223**

(i) What is the **directory entry** of *sports.docs*?

(ii) What is the size of the **memory space** allocated for this *sports.docs*?

(iii) Give one advantage and disadvantage of **linked allocation** method of allocating disk space for files.

(b) Consider the following scenario.

ABC Coaches is a coach company b.ased near Colombo. They specialise in organising day trips to various destinations in Sri Lanka. Customers of ABC Coaches include institutions such as schools, nursing homes etc. They hire coaches with drivers for trips which are organised/arranged especially for them.

The manager of ABC is responsible for allocation of coaches and drivers to trips. Trip records are created when trips are arranged. If a customer is 'new' then the customer's details are recorded. Otherwise, the customer's record is updated.

Customers will typically request that a day trip be organised for them on a specific date. The number of coaches allocated to a trip depends on the number of seats required. In response to this request ABC will check to see if the required coaches can be made available on that date. If the coaches are available ABC will allocate one or more drivers and create a trip record for the customer. Customers are allowed to cancel a trip before a deposit is paid. The deposit should be paid within 7 days of the booking for the trip being taken. If a trip is cancelled after that, the deposit is kept by ABC Coaches. If a trip is cancelled the trip record will record this. ABC will request full payment for a trip in the week before it takes place.

A cancelled trip is deleted from the system 6 months after cancellation. Other trip records are deleted 12 months after the corresponding trips were completed.

Draw the **first level** data flow diagram (DFD) using the SSADM methodology for the above scenario.

(8)

(a) Consider the following scenario.

A School plans to implement a Teachers' Information Management System. The purpose of this system is to identify and manage teachers' responsibilities and tasks. This system uses a database to store the information about teachers, classes and all the subjects.
The registration number, name, contact number, the date of appointment, username, password and job role (whether principal or teacher) should be stored in the system. All the teachers and the principal can access to this system.
All the subjects for each grade should be stored and identified uniquely. subject code, subject name and grade are stored in this system. The teachers are allocated for subjects. Most of the teachers allocated for one subject and there are some cases that a teacher teaches more than one subject. For one particular subject, there can be more than one teacher allocated.
There are four classes for one grade in the school and each classroom can be uniquely identified from the class code and with the class code, the grade, and details of the class teacher should be recorded. One teacher is assigned as teacher in charge for only one class and there is only one teacher in charge for each class.

Construct a single **ER diagram** for the above mentioned scenario and identify attributes and associate them with entity or relationship types and mark primary key attributes for each entities. State any assumptions necessary to support your design.

(b) Consider the following unnormalized data table with data on Students, courses and and Instructors.

StudentCourses table

StudentID	StudentName	CourseID	CourseName	InstructorName
1	John Doe	C101	Database Systems	Dr. Smith
2	Jane Smith	C101	Database Systems	Dr. Smith
3	Bob Johnson	C102	Networks	Dr. Brown
1	John Doe	C102	Networks	Dr. Brown

(i) Write down two **disadvantages** of unnormalized data table.

(ii) John Doe (StudentID 1) decides to drop the "Networks" course. Therefore, the following SQL is executed to **remove** those details.

DELETE FROM StudentCourses WHERE StudentID = 1 AND CourseID = 'C102';

After that, Bob Johnson (StudentID 3) also decides to drop the "Networks" course. Therefore, the following SQL is executed to **remove** those details.

DELETE FROM StudentCourses WHERE StudentID = 3 AND CourseID = 'C102';

Draw the **final output table** obtained fully with data.

(iii) Using the result obtained in **(ii)** above, state the **problem** of the **above unnormalized** data table.

(iv) Convert the above unnormalized data table **StudentCourses** into third normal form.

(9)

(a) Write down a **complete HTML** code to display the following output.

Select you want

☑ I have a bike
☐ I have a car
☐ I have a boat

Submit

(b) Write down a **complete HTML** code to display the following output.

(10)

(a) Write two **differences** between the variables and the constants in computer programming.

(b) A specified number (N) of positive numbers are entered by the user and the **multiplication of odd numbers** among them is to be displayed as a result. Draw a flowchart for this.

(c) Consider the following flowchart.
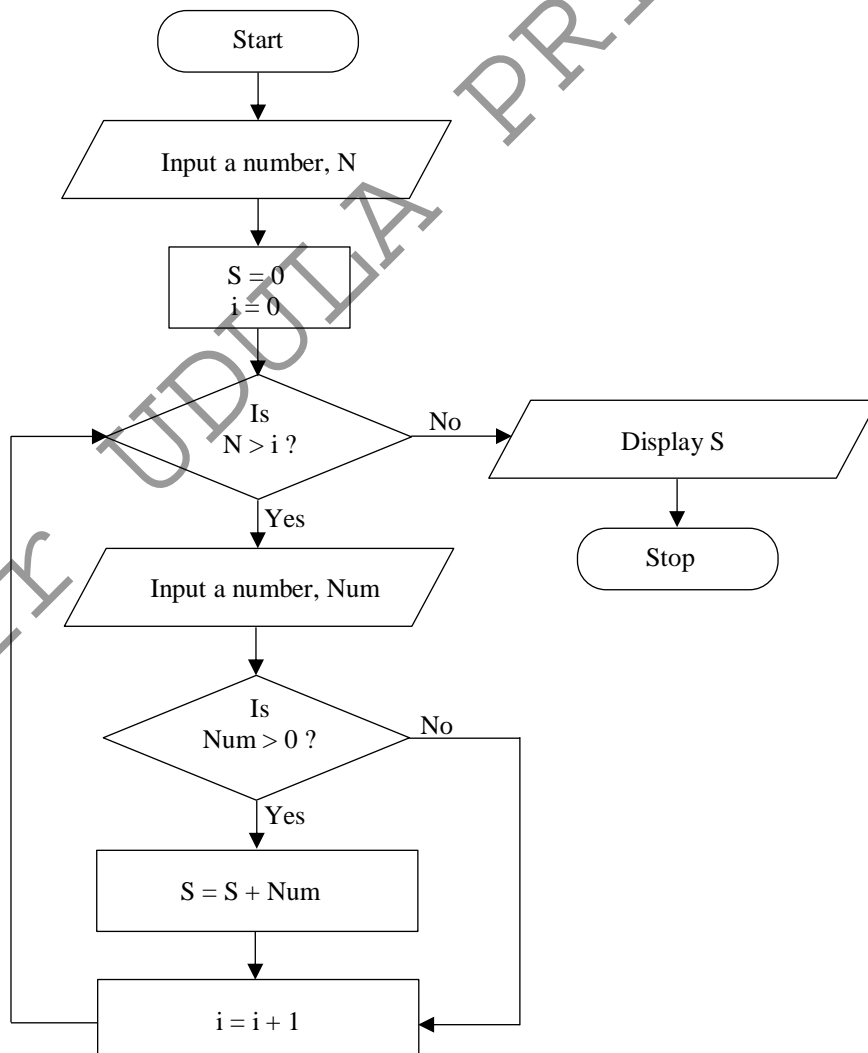
(i) If N is 5 and Numbers such as 4, -7, -5, 3 and 9 are consecutively entered for Num, write the **output** of this flowchart.

(ii) Explain the **purpose** of this flowchart.

(iii) Write down the **full python program** for the logic given by the flowchart.

***