National Field Work Center,
Conducting
G.C.E. (Advanced Level) Examination - 2024, Term - 6

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. Consider the following statements.

A - All the application software are open source software.

B - Some open source software are available to users for free of charge

C - All operating systems are the type of application software

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

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

2. Which of the following actions is typically performed during the **BIOS** startup process?

(1) Loading the application software into memory

(2) Checking and initializing system hardware, such as RAM and hard drives

(3) Installing software updates automatically

(4) Running user-defined application software at boot time

(5) Installing software required for computer

3. Consider the following statements.

A - Files can be accessed from anywhere over the Internet

B - Lower software cost

C - Data privacy / security issues

Which of the above is / are considered to be the advantage(s) of **cloud computing**?

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

[see page no. 2]

4. Which of the following is the best example for **real-time** processing?
(1) System of preparing payroll .
(2) System of preparing the electricity utility bill
(3) Autonomous driverless car control system
(4) System of paying telecommunication payment
(5) System of preparing water utility bill

5. Which of the following is the **major difference** between DRAM and SRAM?
(1) DRAM is faster and costlier than SRAM
(2) DRAM requires regular refreshing which is not the case in SRAM
(3) SRAM has to be refreshed regularly which is not the case in DRAM
(4) SRAM is used in main memory and DRAM is used in cache memory
(5) DRAM is less dense and SRAM is more dense

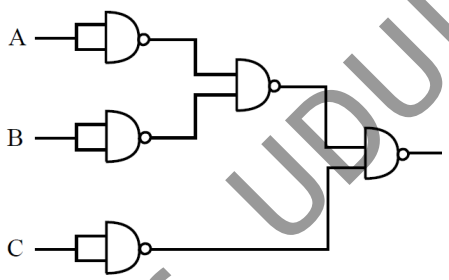
6. If A = 10100010_2 and B = 11101010_2 , What is the value of A **XOR** B?
(1) 00010101_2 (2) 11100010_2 (3) 11101010_2 (4) 01001000_2 (5) 10001010_2

7. Which is the **simplified** Boolean expression given by the following Karnaugh map?

BC / **A**	00	01	11	10
0	**1**	**0**	**1**	**1**
1	**1**	**0**	**0**	**1**

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

8. Which of the following is **equivalent** to the output of the following logic circuit?



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

9. The **two's** complements of ($+28_{10}$) and (-22_{10}) are respectively.
(1) 10011000_2 , 00001011_2 (2) 11111000_2 , 01101011_2 (3) 11101000_2 , 00101011_2
(4) 11101000_2 , 00010011_2 (5) 00011100_2 , 11101010_2

10. What is the **simplified** expression of the Boolean expression $(A + B)(\bar{A} + C)(B + C)$?
(1) $A\bar{C} + \bar{A}C + B$ (2) $\bar{B}(A\bar{C} + \bar{A}C) + B$ (3) $BC + B\bar{A} + AC$
(4) $A\bar{C} + B$ (5) $B + A\bar{C} + \bar{A}C$

[see page no. 3

11. In the operating system, "…….. helps increase file retrieval speed by **consolidating** fragmented files on the hard disk. Which of the following is most suitable for filling the blank?
(1) Fragmentation
(2) Disk partition
(3) Defragmentation
(4) Task manager
(5) File manager

12. Consider the following paragraph about the **virtual memory's function** in an operating system.

"……①……. may require more memory than ……②…… when executed. Between RAM and ……③…..…., virtual memory works by temporarily swapping parts of program data and code between a dedicated area of the hard disk. This process, known as ……④……, ensures that the active parts of a program are cached on the RAM while the less-used parts are stored on the hard disk".
①,②,③, and ④ are the appropriate order to fill the blanks respectively.

(1) ① - Page file, ② - physical memory, ③ - program, ④ - paging
(2) ① - Paging, ② - physical memory, ③ - page file, ④ - program
(3) ① - Program, ② - physical memory, ③ - page file, ④ - paging
(4) ① - Physical memory, ② - program, ③ - page file, ④ - paging
(5) ① - Program, ② - paging, ③ - page file, ④ - physical memory

13. Which of the following is an **advantage** of virtual memory?
(1) Eliminates the need for physical memory
(2) Allows for executing processes that exceed the size of physical memory
(3) Accelerates the execution time of the CPU
(4) Reduces memory requirement of cache memory
(5) Reduces memory requirement of main memory

14. Which of the following function is performed by the **data link layer**?
(1) Packet routing
(2) Error detection and correction
(3) Data encryption
(4) Establishment of a session
(4) Flow control

15. What is the **subnet mask** for a network with 2046 usable hosts?
(1) 255.255.252.0
(2) 255.255.255.0
(3) 255.255.240.0
(4) 255.255.255.128
(5) 255.255.255.64

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16. Which of the following applications is most likely to use **TCP**?

(1) Voice over IP (VoIP)
(2) File transfer protocol (FTP)
(3) Live video telecasting
(4) Online gaming
(5) Live audio streaming

17. Among the media used in data communication and computer networking, which of the following groups only has **unguided** media?

(1) Infra red rays, fiber optic cable, radio waves
(2) Coaxial cable, microwaves, radio waves
(3) Infra red rays, microwaves, twisted pair cable
(4) Infra Red rays, microwaves, radio waves
(5) Twisted pair cable, fiber optic cable, coaxial cable

18. A person P wants to send a message SECURE to person Q securely. For that he encrypts the message using the encryption key +3. Which of the following can be an **encrypted message** / cipher text?

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

19. Consider the following statements about computer **malware**.

A - A computer worm enters a user's computer without their knowledge and collects sensitive information
B - Trojan Horse appears useful to the user before it is installed on the computer, but steals useful information after it is installed on the computer
C - A malware that replicates itself and spreads from one computer to another using a computer network without user intervention

Which of the following statements is / are **incorrect**?

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

20. Consider the following statements regarding **software process models**.

- Functional modules are developed in parallel as prototypes and by integrating them, rapid delivery is implemented and developed.
- When user requirements are well understood, its methodology enables a development team to produce 'fully functional software' in a very short period of time.

Which of the following **software model** satisfies the above statements?

(1) Waterfall model
(2) Rapid Application Development (RAD) model
(3) Spiral model
(4) Object-oriented model
(5) Agile process model

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21. Which of the following statements about commercially off-the-shelf (**COTS**) software is / are correct?

A - They are developed in order to meet the requirements of specific users

B - Users use most of their features as compared to customized packages

C - They are less expensive in comparison with customized packages

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

22. User **acceptance testing** is done by whom?

(1) Carried out by software developers

(2) Carried out by software engineers

(3) Performed by system analyst

(4) Carried out by software designers

(5) Carried out by end users with the help of software developers

23. Consider the following table.

	Information Systems		**Description**
(i)	Executive Support Systems	**(a)**	A system which uses knowledge to solve complicated problems in a logical manner.
(ii)	Decision Support System	**(b)**	An Information System that compiles data and analysis models, or provides the administrative staff with analysis tools, makes the semi-structures and structured decisions of an organization.
(iii)	Expert System	**(c)**	information system that addresses unstructured decision making through advanced graphics and communications for the strategic level users of an organization.

Which of the below given is **correct** in regards to the 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)

24. Consider the following user requirements for a water heater used in bathrooms.

A - It shall be able to hear water above the ambient temperature

B - It shall be able to drain water very quickly

C - It should not allow the water to be heated above 90^0C by it

Which of the above is / are considered only the **functional requirements**?

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

[see page no. 6

25. Which of the following statements about data flow diagrams (DFD) is / are **correct** in structured systems analysis and design methodology (SSADM)?

A - DFD is used to represent the flow of data through a system and the ways in which that data is transformed.

B - DFD can display the physical and logical aspects of a system.

C - DFD is primarily used for modeling data flows at the system analysis stage.

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

26. Consider the following relational database table.

Employee

EmpID	**Name**	**Address**	**Salary**
E001	K. Raj	Jaffna	75000
E002	A.R. Alwis	Galle	60000
E003	W.M.N. Perera	Kandy	80000

Which of the following SQL statement can be used to **change** the table's field Salary to BasicSalary?

(1) alter table Employee change Salary BasicSalary float(8);

(2) alter table Employee Salary change BasicSalary float(8);

(3) alter table Employee add Salary BasicSalary float(8);

(4) alter table Employee Salary BasicSalary float(8);

(5) alter table Employee insert Salary BasicSalary float(8);

27. Which of the following statements about **database normalization** is / are **true**?

A - The basic purpose of the normalization is to reduce data redundancy and improve data integrity.

B - If a table is in the form of the first normal form and all its non-key attributes are fully dependent on the primary key, then it is in the normal form.

C - If a table is in second normal form and if the non-key attributes do not depend on other non-key attributes, then it is in third normal form.

(1) A Only (2) B Only (3) C Only (4) A,B Only (5) A,B,C All

28. Which of the following operations will transform the following table into the **second normal** form (2NF)?

Employee_ID	Project_ID	Project_Name	Department
301	P01	Alpha	IT
302	P02	Beta	HR
301	P02	Beta	HR

(1) Removing repeating groups

(2) Removing dependencies Project_Name and Department on Project_ID

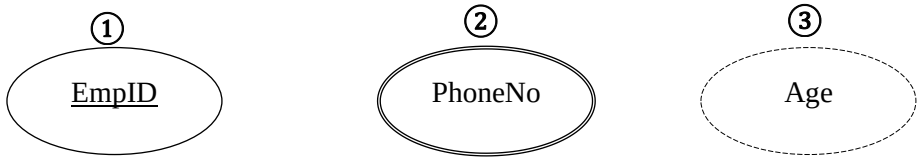
(3) Separating Project_Name and Department in a new table with Project_ID as a primary key

(4) Separating Employee_ID and Department in a new table

(5) Separating Project_ID and Department in a new table

[see page no. 7

29. Consider the following three symbols used for **attributes** in an entity relationship (ER) diagram.



Attributes ①, ② and ③ are respectively.
(1) Derived attribute, identifier attribute, multivalued attribute
(2) Multivalued attribute, identifier attribute, derived attribute
(3) Identifier attribute, multivalued attribute, derived attribute
(4) Identifier attribute, derived attribute, multivalued attribute
(5) Multivalued attribute, derived attribute, identifier attribute

30. Consider the following statements about Python **user defined functions**.
A - A user-defined function must always have at least one parameter value.
B - A user-defined function can pass multiple values as it is called.
C - A user-defined function can be called within another function.
Which of the above is /are **correct**?
(1) A Only (2) B Only (3) A,B Only (4) B,C Only (5) A,B,C all

31. Consider the following Python program.

```
S = 'The way to get started is to quit talking and begin doing'
ch = "e"
c = 0
w = 0
for i in range(len(S)):
    if c % 2 == 0 and S[i] == ch:
        w += 1
        c = 1
    elif S[i] == " ":
        c = 0
print(w)
```

What would be the **output** if this program is executed?
(1) 4 (2) 12 (3) e (4) 6 (5) get

32. Consider the following Python statements.
A - *a, b = (2, [3, 4])*
B - *s = set()*
C - *c = 2, 3, 4*
D - *a = b, c = (1, [2, 3])*
Which of the baove is / are **valid** Python statement(s)?
(1) A only (2) B only (3) A,C only (4) A,B,C only (5) A,B,C,D all

[see page no. 8

33. What would be the **output** if the user is entered 11 in the following Python program?

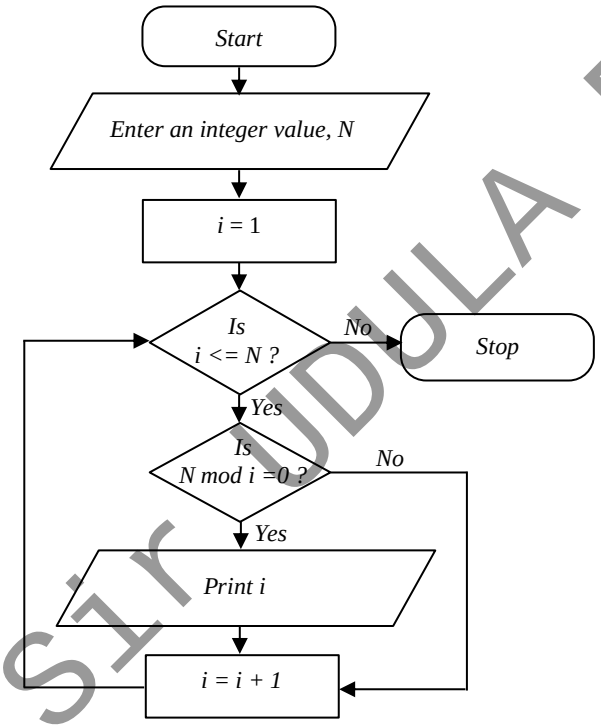
```
res = 'A'
n =int(input())
if n > 5:
   res = 'P'
   if n > 8:
      res = 'Q'
   else:
      res = 'R'
   if n > 10:
      res = 'S'
else:
   res='Z'
print(res)
```

(1) A
(2) P
(3) Q
(4) Z
(5) S

34. If the Python statement *print(5 | 2 ^ 3 >> 2)* is executed, what would be the **output**?

(1) 2 (2) 7 (3) 3 (4) 1 (5) 0

Answer questions (**35)**, and (**36)** using the algorithm given by flowchart given below.



35. Which of the following statements is / are **correct** in relation to the above flowchart?

A - When a negative value is given to N, one output will be shown.
B - When N is given a positive whole number value it stops.
C - When N is given the value 6 the output is 1 2 3 6

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

[see page no. 9

36. Which of the following is/are **equivalent** python programs fiven for the flowchart above?

I

```
i = 1
n = int(input())
while i <= n:
    if n % i == 0:
        print(i)
    i = i + 1
```

II

```
i = 1
n = int(input())
while True:
    if n % i == 0:
        print(i)
    i = i + 1
    if i > N: break
```

III

```
n = int(input())
for i in range (N):
    if n % i == 0:
print(i)
```

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

37. If 5 is given as the input in the following program, what will be the **output**?

```
a = int(input())
n1, n2 = 0, 1
count = 0
while count < a:
    print(n1,end=' ')
    n = n1 + n2
    n1 = n2
    n2 = n
    count += 1
```

(1) 1 2 3 4 5 (2) 0 1 2 3 4 (3) 0 1 1 2 3
(4) 5 (5) 0 1 2 3

38. Consider the following statements in regards to computer programming.

A - Python is an object-oriented programming language.

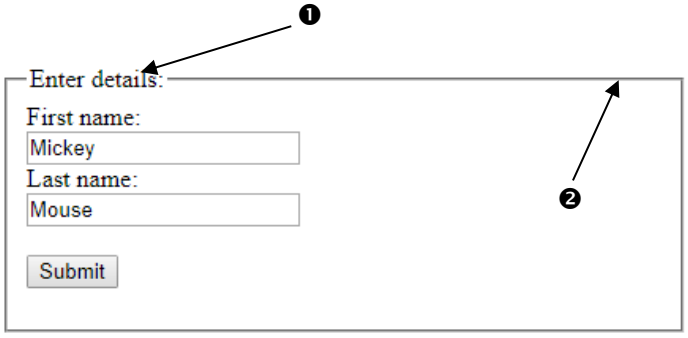
B - First and second generation programming languages are collectively called as " High-level programming languages."

C - Compiler translates one instruction at a time from source code to machine code

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

39. Consider the following HTML web page.



[see page no. 10

HTML tags for ❶ and ❷ are respectively.

(1) <input>, <fieldset> (2) <legend>, <input> (3) <legend>, <fieldset>
(4) <fieldset>, <submit> (5) <legend>, <html>

40. Which of the following is the HTML code to insert an **inline frame** in a webpage?

(1) *<inlineframe href="demo.html" height="200" width="300" title="display"></inlineframe>*
(2) *<frameset src="demo.html" height="200" width="300" title="display"></frameset>*
(3) *<frame src="demo.html" height="200" width="300" title="display"></frame>*
(4) *<iframe src="demo.html" height="200" width="300" title="display"></iframe>*
(5) *<frames href="demo.html" height="200" width="300" title="display"></frames>*

41. Which of the following is the method to use an **external** stylesheet in CSS?

(1) <link src = "stylesheet" type = "text/css" href = "mainstyle.css">
(2) <link rel = "stylesheet" type = "text/css" href = "mainstyle.css">
(3) <style src = "mainstyle.css">
(4) <stylesheet> mainstyle.css </stylesheet>
(5) <link url = "stylesheet" type = "text/css" href = "mainstyle.css">

42. Consider the following CSS code segment.

```
<html>
<head>
<style>
* {
    text-align: center;
    color: blue;
}
</style>
</head>
<body>
    <h1 style="color:red;"> CSS </h1>
    <p style="color:green;"> Style </p>
    <p id="para1"> Selector </p>
    <p style="color:yellow;"> Paragraph </p>
</body>
</html>
```

Which of the following is **correct** regarding the above CSS code?

(1) All the texts will appear blue in color
(2) All the texts will appear red in color
(3) All the texts will appear green in color
(4) All the texts will appear yellow in color
(5) The texts *CSS* will appear in red, *Style* in green, *Selector* in blue, and *Paragraph* in yellow colors.

43. Consider the following statements regarding HTTP **POST** request.

A - It is suitable for handling sensitive data
B - It has a limit on the amount of data being exchanged
C - It can be book marked

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

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

[see page no. 11

44. Consider the following PHP script.

```
<?php
    $cars = array("Volvo", "BMW", "Toyota");
    $arrlength = count($cars);
    for($x = 0; $x < $arrlength-1; $x++)
    {
    echo $cars[$x]."  ";
    }
?>
```

What will be the **output** generated on the web browser when the above PHP script is executed?

(1) Volvo BMW Toyota
(2) Toyota BMW Volvo
(3) Volvo BMW
(4) BMW Volvo
(5) 3

45. In an e-commerce transaction, the **shopping cart** refers to which of the following?

(1) It is a platform where businesses sell products
(2) It is a tool that allows users to know and save products before they buy them
(3) It is a service of providing goods
(4) It is a platform for customers to make payments
(5) It is a customer registration software

46. Consider the following statements regarding **agent** technology.

A - Agents can operate without direct user intervention
B - Agents are designed to achieve specific goals
C - Agents can interact with other agents or users

Which of the following statements is / are **correct**?

(1) A Only (2) B Only (3) A,B Only (4) B,C Only (5) A,B,C All

47. Consider the followings.

A - A large amount of data can be visualized using multidimensional bits (qubits) in the multidimensional method.
B - Can be used in large scale database management such as modeling and encryption
C - Data processing speed is higher than traditional computers

Which of the above is / are **true** about **quantum computing**?

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

48. Which of the following statements can be considered as applications of **Internet of Things** (IoT)?

A - Monitoring the health of farm animals using devices
B - Driving vehicles such as cars in an automated manner
C - Providing a mechanism to monitor and control air pollution in cities.

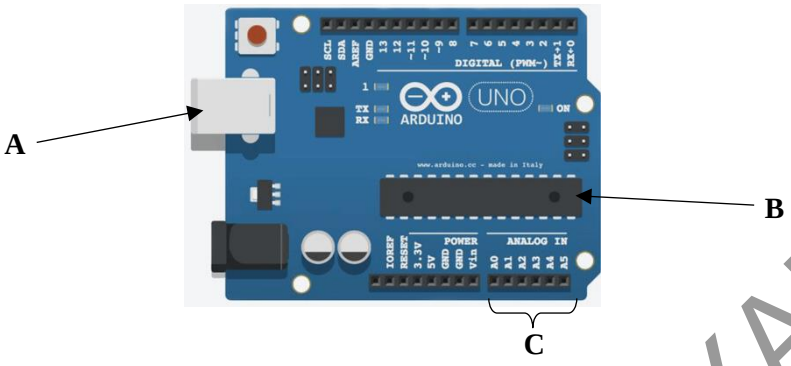
(1) A only (2) B only (3) C only (4) A,B only (5) A,B,C all

[see page no. 12

49. The main benefit of implementing **Kansei Engineering** in product design is:

(1) Reduced material waste
(2) Increased emotional satisfaction of product for users
(3) Faster production times
(4) Reduced product costs
(5) Reduced labour costs

50. Consider the following **Arduino UNO** board.



The components **A**, **B**, and **C** are respectively.

(1) USB plug, Analog In pins, Microcontroller
(2) Microcontroller, USB plug, Analog In pins
(3) Analog In pins, USB plug, Microcontroller
(4) Analog In pins, Microcontroller, USB plug
(5) USB plug, Microcontroller, Analog In pins

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[end]

AL/2024/20/E-II

National Field Work Center, Conducting
G.C.E. (Advanced Level) Examination – 2024, Term - 6

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 **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.

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	

[see page no. 2

Part A – Structured Essay

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

Do not write in this column

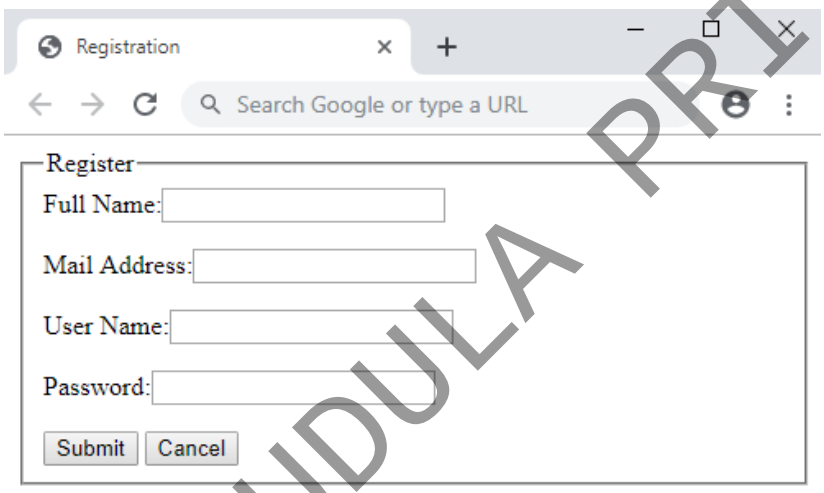
1.

(a)

(i) Write in the box given below how the **output** of the following HTML code segment will be displayed in a web browser.

```
<ul>
  <li> Coffee </li>
  <li> Tea
    <ul>
      <li> Black tea </li>
      <li> Green tea </li>
    </ul>
  </li>
  <li> Milk </li>
</ul>
```

(ii) Consider the following webpage.



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

```
<html>
<head>
        <title> Registration </title>
</head>
<body>
<form action="register.php" method="post">
      <fieldset>
      <legend> Register </legend>
            Full Name: <input type="……" name="name"/>
```

[see page no. 3]

Do not write in this column

```
<p> Mail Address: <input type="……." name="email"/> </p>
                User Name: <input type="……." name="uname"/>
                <p> Password: <input type="……." name="pwd"/> </p>
                <input type="……." name="Submit" value="Submit"/>
                <input type="……." name="Cancel" value="Cancel"/>
        </fieldset>
</form>
</body>
```

(b)

(i) Consider the information in the following table.

Tags	CSS
p	*font → arial* *font colour → red* *font size → 16px*
h1	*font colour → red* *font size → 16px*
div	*font → arial* *font size → 16px*

Using the information in the table, write the ***external style sheet*** using ***group selectors*** only.

……

……

……

(ii) Write the **CSS code for the external style sheet *'***register.css*'* to join the file *'myfile.html'*. (Consider that, both the files are found in the same folder).

……

(c) Consider the following PHP script. Select the suitable words from the given list for the labels from ① to ④.

[see page no. 4

Do not write in this column

```
<?php

$conn = new mysqli ("localhost", "Admin","Admin$890","myDB");

if ($conn->……①……)
{
  die("Connection failed: " . ……②…….->connect_error);
}

$sql = "insert into MyGuests (firstname, lastname, email) values ('John', 'Doe',
        'john@gmail.com')";

if ($conn->query(……③…….) === TRUE)
{
  echo "New record created successfully";
}
else
{
  echo "Error: " . $sql . "<br>" . $conn->error;
}

……④……;
?>
```

Labels	Words for the labels
①	
②	
③	
④	

Lists: [*$sql, $conn->close() , connect_error, $conn*]

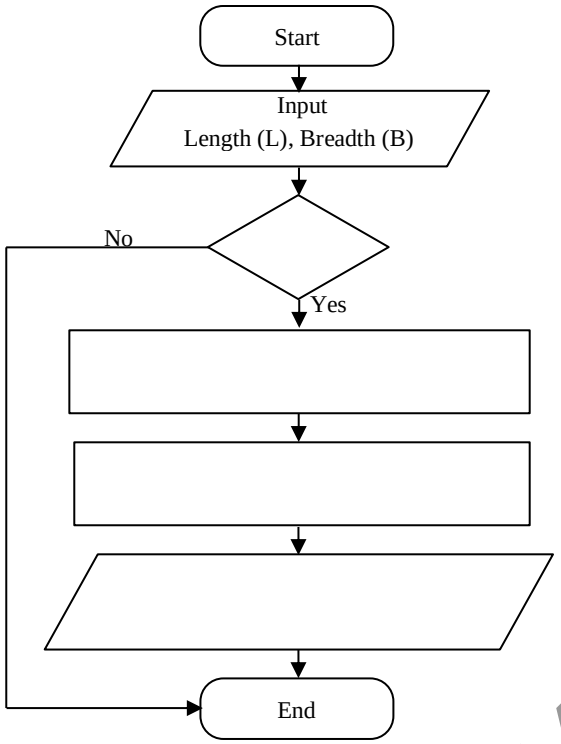
2.

(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)

[see page no. 5

Do not write in this column



(b)

(i) The following Python program with labels ① to ④ gives output the multiplication of positive integers for a given number of user inputs. Fill in the blanks as appropriate in the following table.

```
numbers=list(map(int, input("Enter numbers separated by space: ").split()))
result = 1
p = False
for num in ……①…….:
    if ……②……. > 0:

        result = ……③……..
        p = True
if p:
    print(……④…….)
else:
    print("No result")
```

Labels	Appropriate code
①	
②	
③	
④	

(ii) Give **one similarity and one difference** between variables and constants used in programs.

……

……

……

[see page no. 6

Do not write in this column

(c) The following Python code of segments provide for selecting records from a database. They are not provided in the execution order. Write the codes of **English alphabets** in the blanks given below in the correct execution order (write down the **labels only**).

No.	Lines of source code
A	*ex = conn.cursor()*
B	*res = ex.fetchall()* *for i in res:* *print(i)*
C	*ex.execute ("SELECT * FROM employee")*
D	*import mysql.connector* *conn = mysql.connector.connect(host="localhost", user="root", password="admin", database="myDB")*

1…… **2**…… **3**…… **4**……..

(4)

(a) Consider the following two database tables.

Employee

ID	**FirstName**	**LastName**	**DepName**
1	Nehru	Selvam	Accounts
2	Janakan	Silva	Sales
3	Raj	Selvam	Customer Service
4	Perera	Priyanthi	Sales
5	Riswan	Hakeem	Accounts

Department

DepName	**Manager**
Accounts	1
Sales	4
Customer Service	3

(i) Explain with justification **which normal form** the *Department* table is.

……

……

(ii) "The *Employee* table is in the form of a **third normal** form". Is this statement **correct**? Is it wrong? Give reason.

……

……

[see page no. 7

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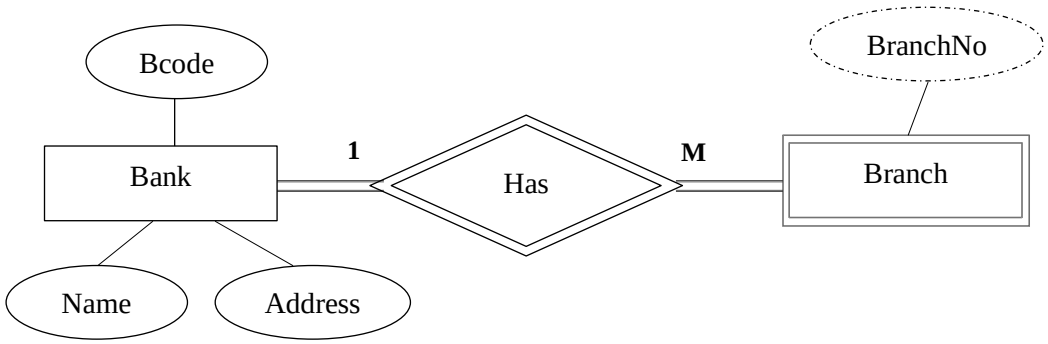
(b) Consider the following segment of ER diagram.



(i) Briefly explain why Branch entity is given in a **different symbol** than Bank entity.

……

……

(ii) Write an **attribute** that uniquely identifies the Branch entity's records.

……

(iii) Write down the **tables in the form of schema** that would be obtained if the ER diagram is mapped into tables.

……

……

……

(c) Select the most suitable term from the following list for the statements **(i)** to **(vi)**

Lists:[Affiliate revenue model, reverse auction , e-marketing, web portal, B2C model, virtual storefront, brick-and-mortar business, competitive advantage, Subscription revenue model, Information broker, mobile marketing, Database marketing]

Statements:

(i) An online marketing technique that uses websites, emails, SMS, social media through Mobile phones, laptops, etc. to reach the target audience to promote products and services.

(ii) Indicates the reasons that allow a company to produce its products and services at a better quality or lesser cost in comparison to its competitors.

(iii) Generates revenue by receiving regular payments at a certain interval of time from the customers.

[see page no. 8

Do not write in this column

(iv) A specially designed website that brings information from diverse sources, like emails, online forums and search engines, together in a uniform way.

(v) A process that executes actions such as distribution of products and services, price fixing in a planned manner to satisfy customer needs in the digitized environment such as the internet and the World Wide Web.

(vi) A term mostly used to indicate a company which uses retail stores or warehouses for its commercial activities.

Write the **most suitable terms** in the table given below.

No.	Term
(i)	
(ii)	
(iii)	
(iv)	
(v)	
(vi)	

4.

(a) Consider the following situation.

RK Builders is a company offering house building and property improvement services to the public. The proprietor of the company employs a number of skilled workers such as bricklayers, carpenters and plumbers. The proprietor manages the building projects himself, and may occasionally help with the construction work.

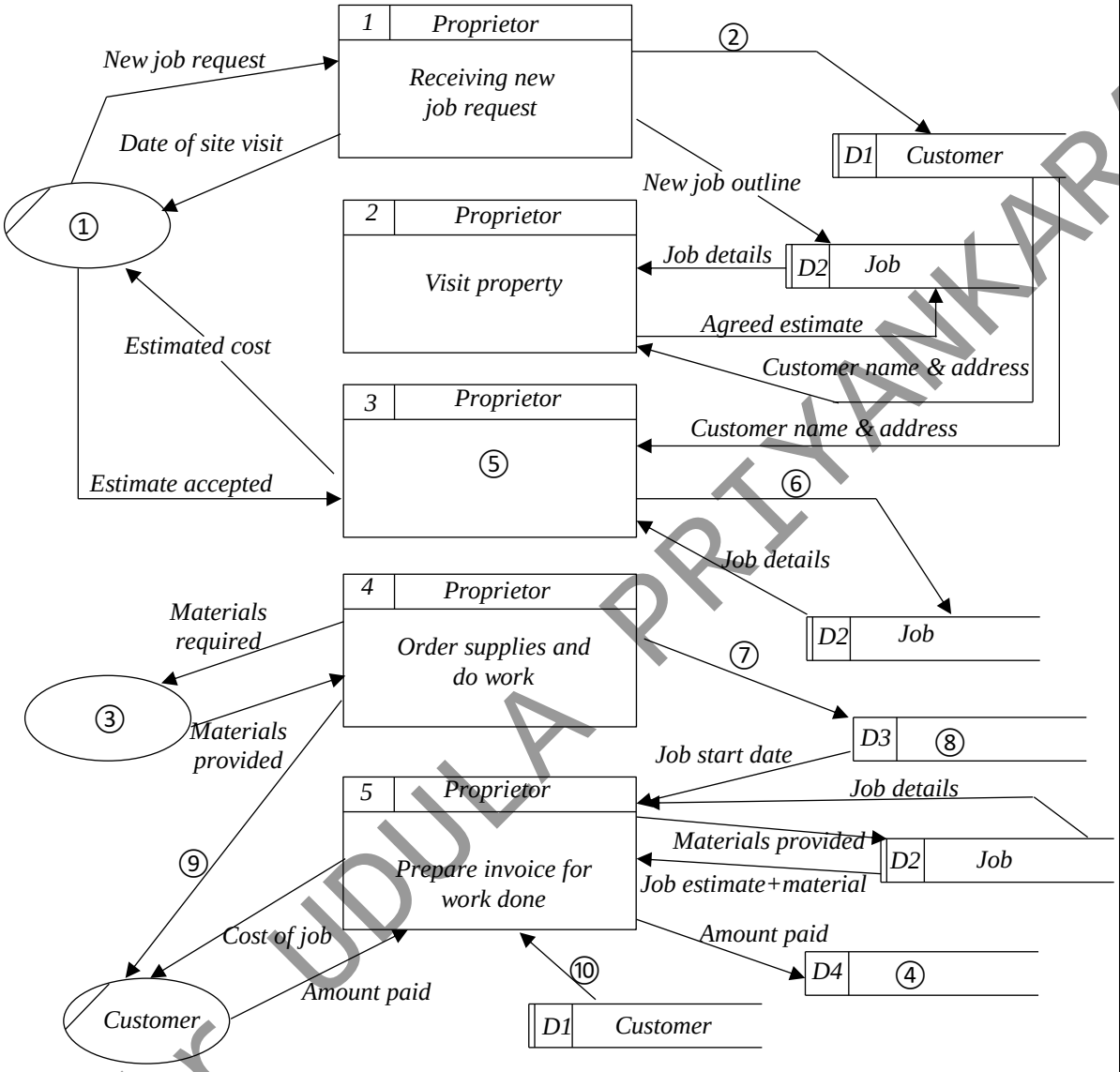
RK Builders wants to computerize the management of building work. This includes processing of estimates, job scheduling, and payments as described below in more detail.

When a customer contacts the company to ask for an estimate, the proprietor makes a note of the customer's contact details and an outline of the proposed work. He agrees a date with the customer to view the property in order to give an estimate of the cost for the work. When visiting the property on the agreed date the proprietor adds more detail to the outline of the proposed work. Within 3 days of visiting the property the proprietor produces a fully detailed estimate and sends it to the customer. If the customer agrees the estimate, the proprietor schedules a date to start the job (this is based on the size of the job and other jobs that have already been scheduled).

[see page no. 9

Do not write in this column

A few days before the agreed start date of a job, the proprietor contacts the customer to confirm the start date, and then orders the required building materials from suppliers to be delivered on the date the job starts. At the end/completion of the job the proprietor calculates the actual cost of the job to produce an invoice which is sent to the customer. The customer has 30 days to pay the invoice.



Fill in the blanks with the suitable words for the above level 1 Data Flow Diagram (DFD).

① ……

② ……

③ ……

④ ……

⑤ ……

[see page no. 10

Do not write in this column

⑥ ……

⑦ ……

⑧ ……

⑨ ……

⑩ ……

(b) A computer system's virtual memory address space is 32-bits, its page size is 4 KB, its physical memory is 1 GB, and its frame size is 4 KB.

(i) What is the number of **pages**?

……

……

(ii) What is the number of **frames**?

……

……

(iii) What is the **size of the page table** for a process?

……

……

**

[see page no. 11

National Field Work Center,
Conducting
G.C.E. (Advanced Level) Examination - 2024 , Term - 6

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 Boolean expression with A, B, and C as inputs and Z as output.

$$Z = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C}$$

(i) Construct a **truth table** for the above Boolean expression.

(ii) Complete the following Karnaugh map for the above Boolean expression.

C \ AB	00	01	11	10
0				
1				

(iii) Using the Karnaugh map given in **(i)** above, give a **simplified** Boolean expression in the form of sum of products (SOP). Show the loops clearly as appropriate.

(iv) Give a **simplified** Boolean expression in the form of product of sums (POS) using the Karnaugh map given in **(i)** above. Show the loops clearly as appropriate.

(b)

(i) Using Boolean algbraic rules, **simplify** the Boolena expression $A\bar{B} + \left(\overline{\bar{A} + \bar{B} + C.\bar{C}}\right)$.

(ii) In Boolean algebra, state the **associative** law.

(6)

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

(b) Give **one reason** why UDP could be used instead of TCP in an application for live broadcasting in the Internet.

[see page no. 12]

(c) Consider the following situation.

A company that manufactures fruit juice drinks in the capital city has four local araea networks (LANs) for each of the departments such as information systems, production, marketing and accounting. In the table given below, each department has their number of computers.

Departments	**Number of computers in each department**
Information system	*20*
Production	*23*
Marketing	*18*
Accounting	*19*

An IP block 192.248.16.0/27 has been assigned to the network administrator. The network administrator has to assign IP addresses to all the nodes in each department. Four sub-networks will be set up for this purpose

Use the following table as a guide to assign IP addresses (use a fixed-length subnet mask (FLSM)).

Departments	**Network address**	**Broadcast address**	**Subnet mask**	**Usable IP address range**
Information system	*192.248.16.0*	*192.248.16.31*	*255.255.255.224*	*192.248.16.1 - 192.248.16.30*
Production				
Marketing				
Accounting				

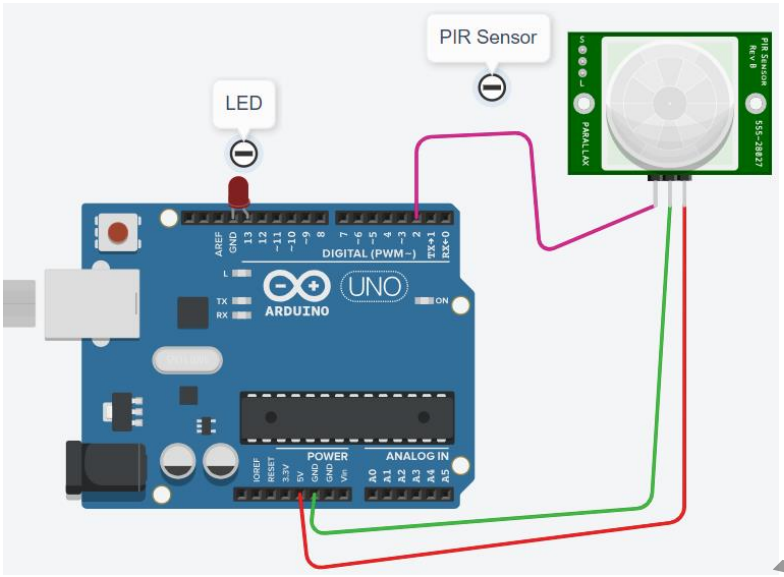
(d) Write two main **differences** between IP address and MAC address.

(e) Give **one advantage** of using a variable-length subnet mask (VLSM) over using a fixed-length subnet mask (FLSM) to assign IP addresses.

[see page no. 13

(7)

(a) Consider the following **Arduino** logic circuit and its code. In this, Arduino Uno board, PIR sensor and LED are available.



Code

```
int led = 13; int sensor = 2;int state =
LOW; int val = 0;

void setup()
{
 pinMode(led, OUTPUT);
 pinMode(sensor, INPUT);
 Serial.begin(9600);
}

void loop()
{
 val = digitalRead(❶);
 if (val ==❷)
 {
  digitalWrite(led, HIGH);
  delay(100);

  if (state ==❸)
  {
   Serial.println("Motion detected!");
   state = HIGH;
  }
 }
 ❹
 {
   digitalWrite(led, LOW);
   delay(200);

   if (state == HIGH)
   {
    Serial.println("Motion
     stopped!");
    state = LOW;
   }
}
```

(i) **Why** is **PIR** sensor used?

(ii) Briefly explain the **purpose** of the above mentioned circuit.

(iii) Write the code for numbers starting from ❶ to ❹ from the list given below.

Lists: [HIGH, LOW, else, sensor]

(b) **EverFit** is a business that sells readymade clothes. At present, the business continues sales through the 25 branches nationwide. The company has realized that by selling their clothes through the Internet that they can gain many benefits.

(i) What kind of e-business model is **EverFit** selling readymade clothes via the Internet to the customers?

(ii) Explain two benefits **EverFit** can gain transforming to e-business.

(iii) **EverFit** decides to expand its website to other businesses as well. Other businesses can sell their clothes through this as well. State two e-revenue models that **BestFit** can use here.

[see page no. 14]

(c) Consider the following scenario.

EverFit is a multi-agent system website. It helps in customers browing and purchasing clothes for them.

A **Customer** is contacted by a **chat-bot** when they enter the **EverFit** website. The Customer can provide their requirements either through voice or test. During this, the data collected by the **chat-bot** is sent to an **extraction agent**. The extraction agent summarises the extracted data and sends the information to the **Search agent**. The search agent uses multiple sub agents to collect results in a quick and efficient manner. In the end, the results collected by the sub agents are given to the search agent. After, the search results are given to the customer

(i) Draw a **simplified diagram** for the above multi-agent system. Label all the entities in your diagram and indicate the inter-relationships between each of them.

(ii) Name the **self-autonomous** software agents of this multi-agent system.

(8)

(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** (ER) diagram for the given scenario. If any assumptions are used, state them clearly.

(b) The following table shows the details related to a course.

Course

StudentID	CourseID	CourseName	InstructorID	InstructorName
101	1	Math	9001	Dr. Smith
101	2	Science	9002	Dr. Jones
102	1	Math	9001	Dr. Smith
103	3	History	9003	Dr. White

[see page no. 15]

(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.

(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?

(9)

(a) Consider the following scenario.

An deployment strategy is to run two or more versions of an application software simultaneously in a bank. All users (clients) can be directed to use different versions based on a specific set of rules. This allows gradual testing and transition between versions during software development without affecting all users at the same time.

(i) Which **deployment strategy** is appropriate for this? Give reason.

(ii) Write one **advantage** of the deployment strategy you presented in **(i)** above.

(iii) Write one **disadvantage** of the deployment strategy you presented in **(i)** above.

(b) Consider the following extract from a software feasibility study report.

…… "QuickBuy Mart" retail store is currently using a manual system to manage its products. A store owner wants to develop a custom inventory management software that can track inventory and provide detailed sales reports. During this, software development cost and development time frame are examined. And questions are posed like Can software be developed based on existing technical resources? ……

Write the appropriate **feasibility studies** mentioned above in this report.

(c)

(i) Briefly explain what **acceptance testing** is used in the testing phase of software development and **who** carries it out.

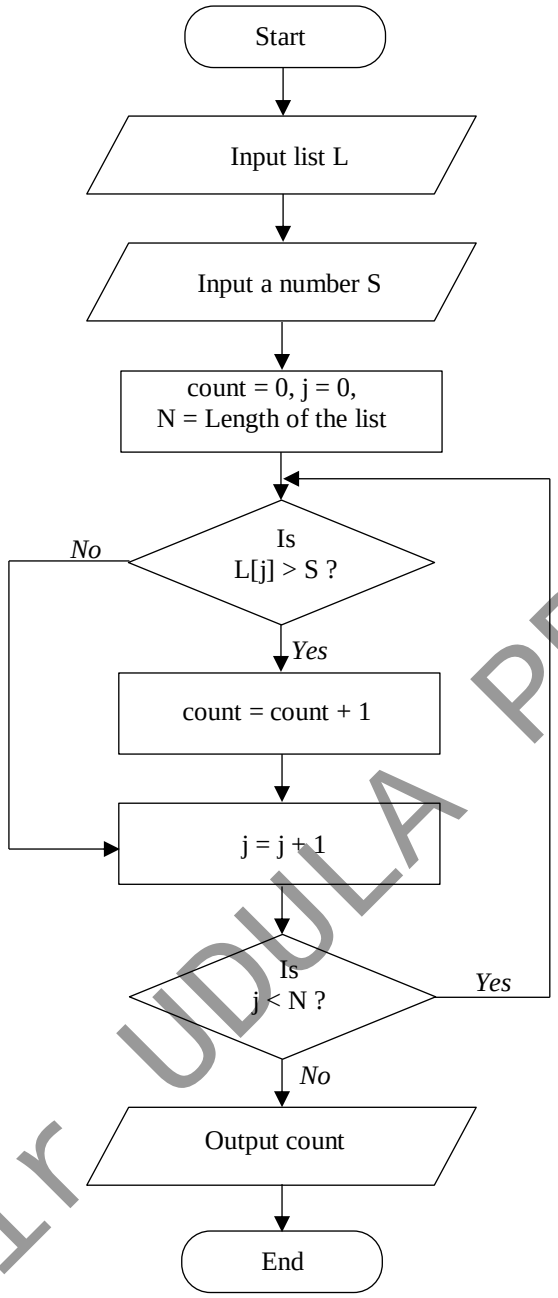
(ii) Compare and contrast the **two characteristics** of the software process model, the agile model with the waterfall model.

[see page no. 16

(10)

(a) A particular number of subject marks (consider as N) are entered 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.

(b) Consider the following flowchart.



(i) Write the **output** of the flowchart if the list L consists of the numbers 5, 4, 7, 4, 4, 3, 2, 1, 5, 6 and input S is 3.

(ii) Explain the **purpose** of the Flowchart.

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

***

[end.