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Provincial Department of Education - NWP

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Third Term Test - Grade 13 - 2023

20 S II

Index No.: .....

Information And Communication Technology- II

03 hours

Answer **all** questions in **part A** and select only **four** questions from **part B**

- Answer all questions of part A in the **paper itself**.
- The answers should be written in the space provided.

Part A - Structured Essay

1. Consider following HTML code segment.

```
1.  <html>
2.  <body>
3.  <!-- section-1-->
4.  <h1> welcome your page </h1>
5.  <h2><u> student Time Table</u></h2>
6.  <!-- section-2-->
7.  <table border='1'>
8.  <caption> Table1 </caption>
9.  <tr><th rowspan='2'> name</th> <th colspan='2'>subject</th></tr>
10. <tr><td> sub1</td><td> sub2</td></tr>
11. <tr><td> praveen</td> <td> ICT</td> <td> English</td></tr>
12. </table>
13. </body></html>
```

(a) Draw the output expected from 6-12 lines as rendered by the web browser.

(b) Rewrite the HTML code given in "note.html" file using Inline CSS method.

File - note.html

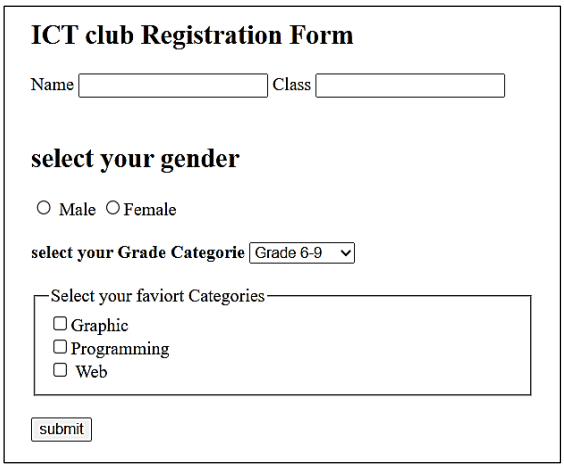
```
<html> <head>
<link rel="stylesheet" type="text/css" href="mystyle.css">
</head> <body>
<h1>Cascading style sheets </h1>
<p ><u>Cascading style sheets,</u> <br>fondly referred to as CSS is a simple design Language intended to simplify the process of making web pages presentable </p>
</body> </html>
```

File - mystyle.css

```
h1, p { font-family: arial;
        text-align:center;}

p{ color: blue; }
```

(c) Consider the following HTML form which is rendered by a web browser.



The incomplete HTML code for this form is given below. Fill in the blanks of the given code to obtain this form as the output.

```
<html> <head> <title> registration form</title> </head>
<body>   <h2> ICT club Registration form </h2>
<form action= 'display.php' method='post'>
<div>…… <input …… = ……     ……= 'name'/>
…… <input …… = ……     ……= 'class'/>
</div><br>
<p><div>
<h2> select your gender</h2>
<input ……=……     ……='gender'  ……='male'/> Male
<input ……=……     ……='gender'
……='female'/>Female
</div><br>
<div>
<b> select your Grade Categorie </b>
```

```
<…….. name= 'Grade'>
<……..  ……..='Grade 6-9'……..>  ……..  </……..>
<……..  ……..='Grade 10-11'> ……..  </……..>
<……..  ……..='Grade 12-13'> ……..  </……..>
</……..>
</div><br>
<div style="width:450px;">
<fieldset>
<……> Select your faviort Categories  </……..>
<input ……= ……..  ……='Catogary1' ……. ='Graphic'/>……<br>
<input ……= ……..  ……='Catogary2' ……..='Programming'/>…… <br>
<input ……= ……..  ……..='Catogary3 '……..='Web '/> …….. <br>
</fieldset></div>
<br>
<input type='submit' name='submit' value='submit'>
</form> </body> </html>
```

(d) After completing and submitting the above form, the instruction set given in "display.php" is executed. When completing the form by a student, the name, class, gender and the Grade Category should be displayed. Complete the following code to fulfil that requirement.

```
<?php
if ($_SERVER['REQUEST_METHOD']=="POST")
{ $name= $_.....['……..'];
 $class= $_.....['……..'];
 $Grade= $_.....['……..'];
 $Gender=$_.....['……..'];}
echo "<h2> Your details: <h2>";
echo 'name:-',……., "<br>";
echo 'Class:-', ……..……, "<br>";
echo 'Gender:-', ……., "<br>";
echo 'Grade:-', ……., "<br>";
?>
```

2. (a) Get the suitable item selected from the given list to complete following statements and write it in the space provided below the statements.

(i) In the transmission of a signal .....❶..... occurs due to unnecessary signals generated from external energy signals.

(ii) To identify the errors occurring in a communication system, simple methods such as ..... ❷..... are used.

(iii) ..... ❸..... operates in multiple layers and communicates data using completely different protocols.

(iv) When a composite signal is transmitted through a media, occurring changes in the form or shape of the sub components of the signal is known as ..... ❹.....

(Network layer, DNS, CSMA/CD, Transport Layer, Gateway , ICMP, HTTP, Noise, Attenuation, Distortion, Parity check, Router, Overall Test)

❶..... ❷.....

❸..... ❹.....

(*b*) Select the most suitable items for following statements from the given list.

List : { Bit Coin , Credit Card , E-market place , Pure click organizations, Group Purchasing, Virtual Store fronts , Reverse auction, Pure brick organizations}

(i) The sellers reduce the prices to obtain the sale. (……)

(ii) The main purpose of this is to increase the purchasing power as the discounts granted from suppliers are higher due to purchasing in more quantities.(……..)

(iii) The consumers can purchase goods or services by connecting with the business only through internet. (……)

(iv) It is a totally online currency unit that can be used for making payments in a more secured way. (……)

(*c*) State accuracy of following expression which are related to the features of Microcontrollers used to actuate and control devices in Internet of Things systems. Mention "correct" if the statement is correct or "wrong" if it is incorrect.

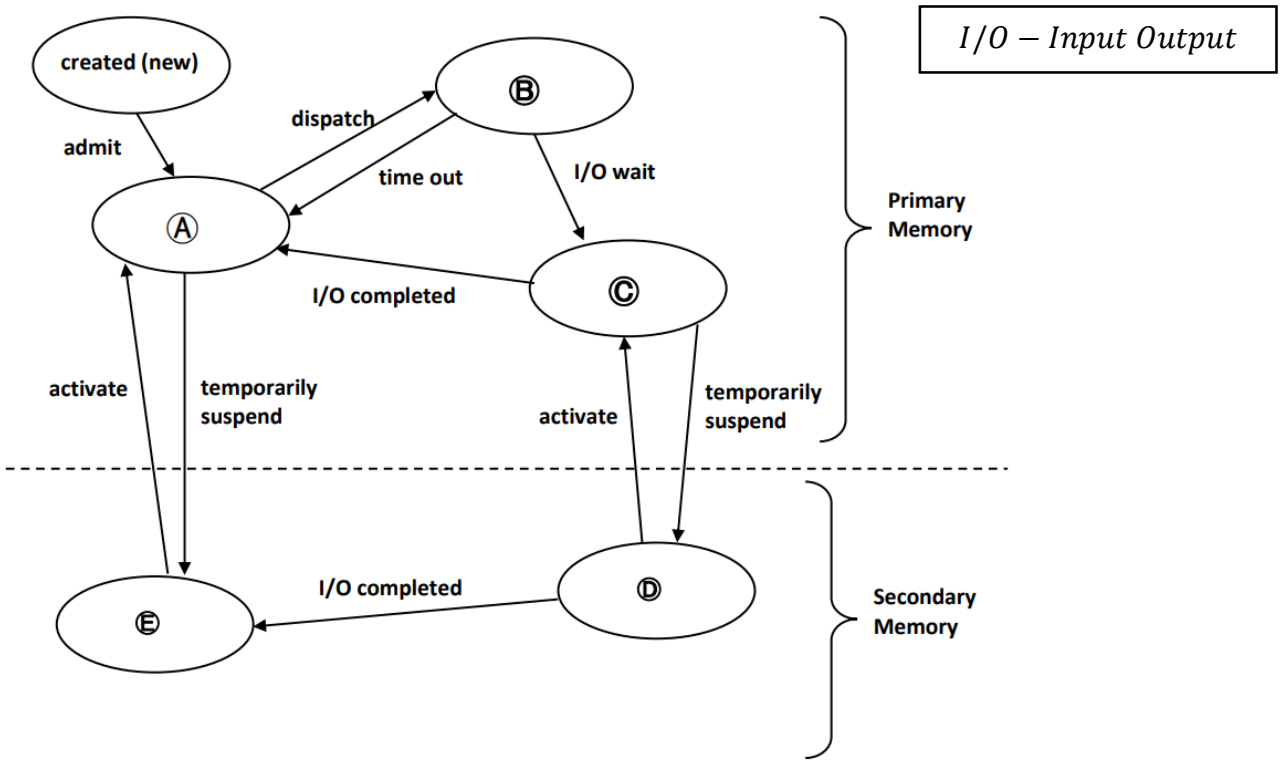
(i) RAM, ROM, Input/Output ports, have been fixed to another board separately from Microcontroller. (……)

(ii) Power consumption is less and can be operated used in external batteries. (…….)

(iii) The circuits are smaller as peripheral devices are located internally. (…….)

(iv) Word size is about 8bit/16bit (……)

3. Consider the following process states transition diagram.



(a) Fill in the blanks given below mentioning the most suitable terms for Ⓐ,Ⓑ,Ⓒ,Ⓓ and Ⓔ in the above image.

Ⓐ - .....

Ⓑ - .....

Ⓒ - .....

Ⓓ - .....

Ⓔ - .....

(b) What are the schedulers used to schedule processes among following process states in the given diagram.

Ⓐ to Ⓑ - .....

Ⓒ to Ⓓ - .....

created(new) to Ⓐ - .....

(c) If a memory address contains 24 bits and the memory is two bytes addressable, calculate the memory size.

.....

.....

.....

(d) In the linked allocation method, when accessing for a file if there is an error in a block next block of the file becomes inaccessible. Briefly describe how this weaknesses is removed by using FAT.

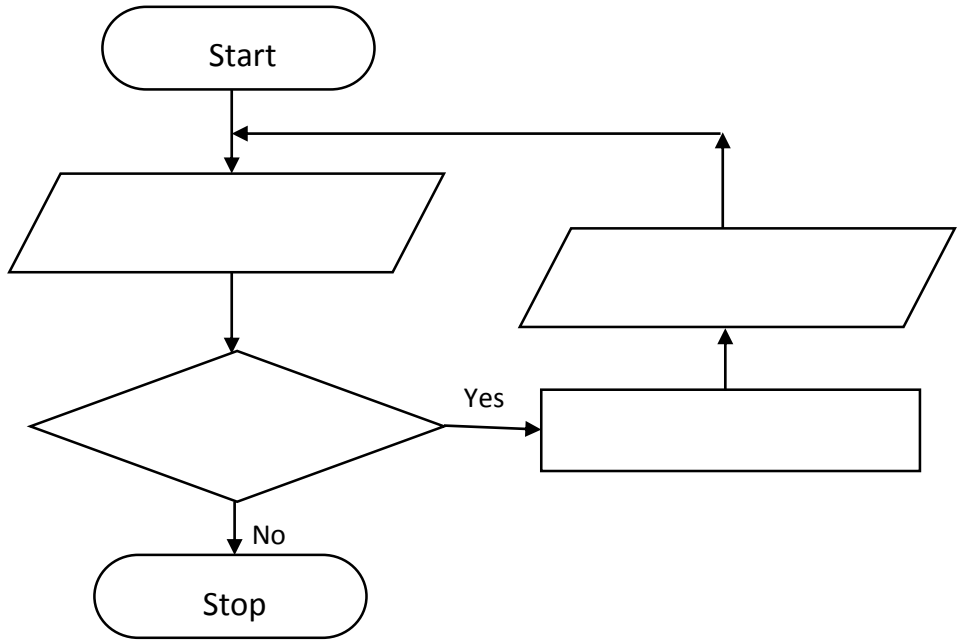
.....

.....

.....

.....

4. (a) It is required to draw a flow chart to calculate the area of a rectangle and output . The length and the width are given as inputs. The algorithm should terminate when an input is less than or equal to zero. Complete the flowchart by writing the suitable statements for empty symbols of the given flow chart.



(b) Fill in the blanks of the following python code that displays first ten multiples of a number given as the input.

Note - For examples the multiples of number two can be expressed as 2, 4, 6, ... 20.

```
num = …….. (input("Enter the number to be multiplied : "))
for i in range (……. , ……..):
   print(……)
```

(c) Write the output of following python code.

```
def fib(n):
    a,b = 0,1
    while a<n:
        print(a,end = ' ')
        a,b = b,a+b
fib(5)
```

……

……

(d) The content of a text file called "ABC.txt" is "I am learning".

(i) What is the output of following python code?

```
f=open('ABC.txt','a')
f.write(" Python")
f=open('ABC.txt','r')
y=f.read()
print(y)
f.close
```

……

……

(ii) Write the line of code that need to be changed in the code mentioned in (i) above to get only "Python" as output, along with that change.

……

……

Part - B

5. (a) Transform the $\bar{A}BC + A\bar{B}C + AB\bar{C}$ standard SOP logical expression to the POS logical expression.

(b) Following is a description of a certain logic circuit.

This circuit takes 03 input signals. They are named A, B, C respectively. All those inputs are processed through an XOR gate to get the first output (P). That output is again processed with input B through an OR gate to obtain a second output (Q). The second output is again processed with input C through an AND gate to obtain the final output (R).

(i) Construct the logic circuit diagram that represents the process in this description.
(ii) Construct a truth table showing the inputs and output connections for that circuit diagram.
(iii) Using the truth table, derive a SOP Boolean expression for the output of the circuit.
(iv) Using Karnaugh maps, simplify the Boolean expression obtained in (iii) above.
(v) Construct a logic circuit diagram for the simplified Boolean expression, by using a suitable universal gate.

6. (a) Write down the most suitable terms to replace the blanks labelled ❶ to ❻ in the following paragraph related to Open System Interconnection Model (OSI).

Under the Open System Interconnection Model, the data transmission process between computers takes place in .....❶..... layers and bit transmission from one node to another node is done by the .....❷..... layer. Also, ensuring error-free data transfer from one node to another and Logical Link Control as well as Media Access Control are performed in .....❸..... layer. It is the responsibility of the .....❹..... layer to segment the data received from the upper layer by the node to which the data is sent and execute flow and error control operations. The .....❺..... layer controls synchronization and dialogs while the translation of data between different encoding schemes is a function of the .....❻..... layer.

(b) There is a need to create a computer network connecting four departments of an organization. Those departments are Sales and Purchase Department, Development Department, Accounts Department and Management Department. The 192.200.1.0/25 IP address block is given to the network administrator of the organization, and IP addresses for the respective departments are to be allocated.

In addition to the number of computers in the development department, the network administrator has decided to add a proxy server and provide internet connection to other networks of the organization through that network.

It is required to subnet the above IP address block to satisfy the following requirements. Assume that each department is located in a separate building.

Subnet Number	Department Name	Number of Computers	Servers
D001	Sales and Purchase	15	-
D002	Development	30	Proxy Server
D003	Accounts	12	-
D004	Management	14	-

(i) Write the first address and the last address of the given IP address block.
(ii) Write the subnet mask of the given address block in dotted decimal notation.
(iii) How many host bits are needed to create the required number of subnets?
(iv) Once subnetting is done, copy the following table to your answer sheet and fill it.

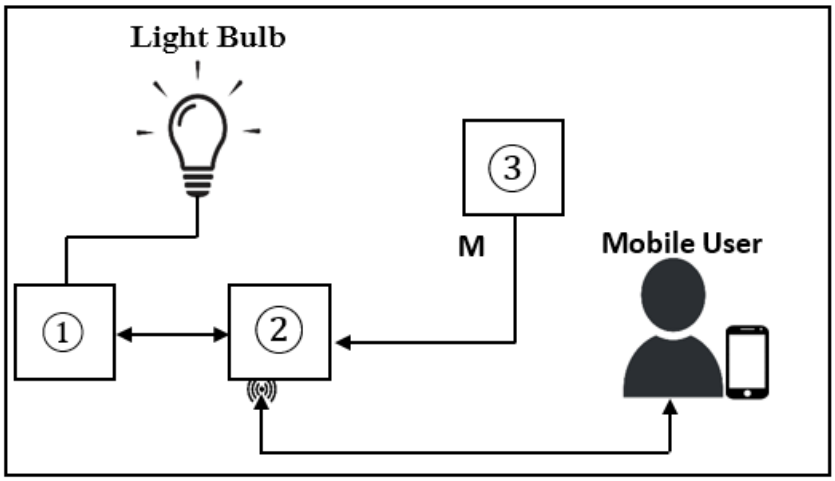
Subnet Number	Network Address	Subnet mask	First usable IP address	Last usable IP address	Broadcast Address
D001	.....	.....	.....	.....	192.200.1.95
D002	192.200.1.0	.....	.....	.....	.....
D003	.....	.....	192.200.1.97	.....	.....
D004	.....	.....	.....	.....	.....

(c) (i) Write one difference between Symmetric Key Encryption and Asymmetric Key Encryption.
(ii) Write two threats that malicious software can cause to a computer network.

(d) (i) Write two functions of a Proxy server

(ii) What is the functionality of a Domain Name System (DNS) server ?

7. (a) The following figure shows an abstract design of an IoT setup, designed to turn on the lights automatically at night in an unoccupied house and turn off the lights when the sun rises in the morning.



A mobile application is also used to control the switch that activates the lighting system with lights. As shown in the figure, the setup includes a Sensor - **S**, a Current Controller – **C** and a microcontroller - **A** (Arduino Board) with a communication module.

(i) Match the IoT components labelled as **A**, **C** and **S** to letters of the components described in the above scenario to the corresponding positions (①, ②, ③) in the figure.
(ii) Explain the reason why the arrow M is shown in a single direction.
(iii) The sensor in the above setup is intended to detect the intensity of sunlight in the environment. Write down the name of the appropriate sensor for this identifier.

(b) Note that the light intensity level (Analog Input) from the sensor mounted in the box is used as a decimal value in the microcontroller. An algorithm is shown on the right to detect when the light intensity level is in the range of 0 to 63 and turn on the lights, and when the light intensity level is in the range of 64 to 1023, it is a case of sunrise and turn off the lights. Write down the most suitable entries for the places labeled X, Y, P, Q and S.

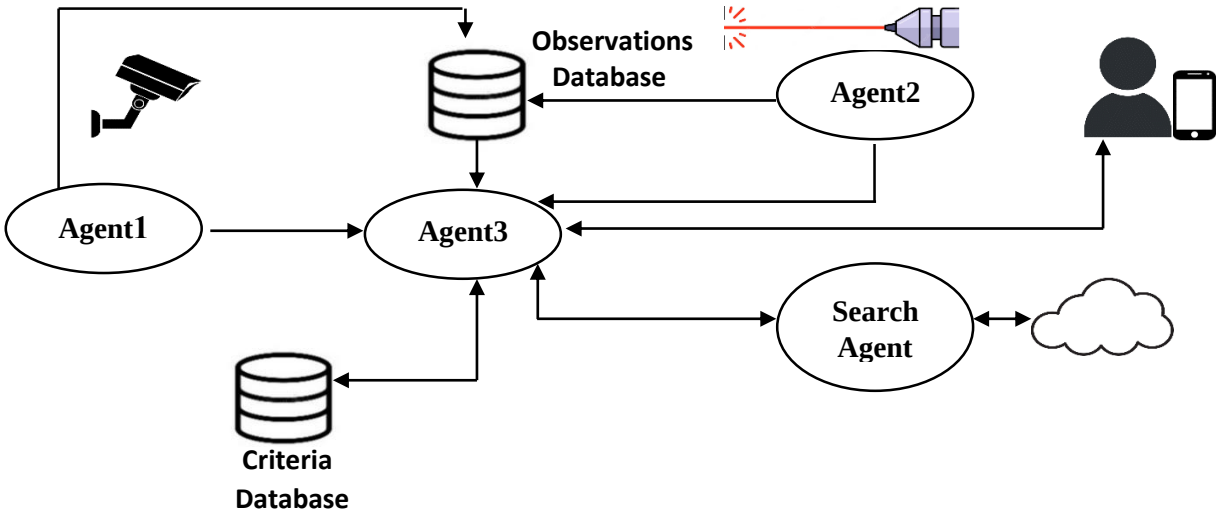
```
While (true){
      Read Light Intensity Level as M_L
      If [X and Y]
            If Current Controller is ON
                  Then Turn off the Current Controller
            End if
      Else
            If [P and Q]
                  If [R]
                        Then Turn on the Current Controller
            End if
      End if
}
```

[**Note -** While(true) block represents the continuous loop function in Arduino.]

(c) Another sensor is intended to be connected to this system to detect the entry of an animal (especially a human) into or near the house. Choose and write the most suitable sensor from the terms given in brackets

{LDR, IR, Motion- PIR, Touch}

(d) A multi-agent system (pictured below) is proposed for this house, considering several benefits. A user can connect with the system through his mobile phone. In that system, if a human behavior is detected by the inputs obtained by several video cameras installed in the house, the photographs are stored in the database called "Observations". The multi-agent system works as follows.



- Agent1 examines the video from the cameras and sends only the images suspected as a human movement to the "Observations" database and informs Agent3 about it.
- Agent2 sends information (time and location etc) about a human movement detected by the laser beam to the "Observations" database and informs Agent3 about it.
- Agent3 compares newly added photos and other information to the "Observation" database with criteria in the "Criteria" database. And if there is information that doesn't match the existing criteria, a search agent is called to check the information.
- Search agent searches relevant information from the Internet. Once the results are fed to Agent3, Agent3 notifies the user if an alert is required, and updates the "Criteria" database with new information.

(i) In the given scenario who is/are the self-autonomous agent(s)?

(ii) Write two expected advantages of such a multi-agent system

(iii) Briefly explain a disadvantageous situation that Agent3 may encounter when calling Search Agent to find new information.

(e) The owners of this system intend to provide opportunity to be assisted by the agent system described above to the other home owners with CCTV systems in the area.

(i) What is the expected business revenue model to be used, if the access to the system and services are going to be provided by doing a monthly or yearly payment?

(ii) Write down an advantage and a possible disadvantage to the owners of this system by giving the opportunity to the community nearby to use it.

(iii) Briefly explain an action that can be taken by using a new agent, to avoid the potential disadvantageous situation regarding the security of data in the existing system.

8. Note that in the following Python program, a number greater than 2 digits is always given as input.

(a) (i) What is the output of the following python script if 205 is given as the input?

```
print("Enter a Number: ")
num = int(input( ))

count = 0
while num!=0:
   if count = = 0:
      A = num%10
      count = count+1
   B = num%10
   num = int(num/10)

output = A + B
print("output is  ", output)
```

(ii) What would be the modification required, to the output = A + B code line of the above python code if first and last digit of a given positive number to be printed?
(Example : if the input is 1234, the output should be 14)
(Note - It is sufficient to write only the modified, relevant line.)

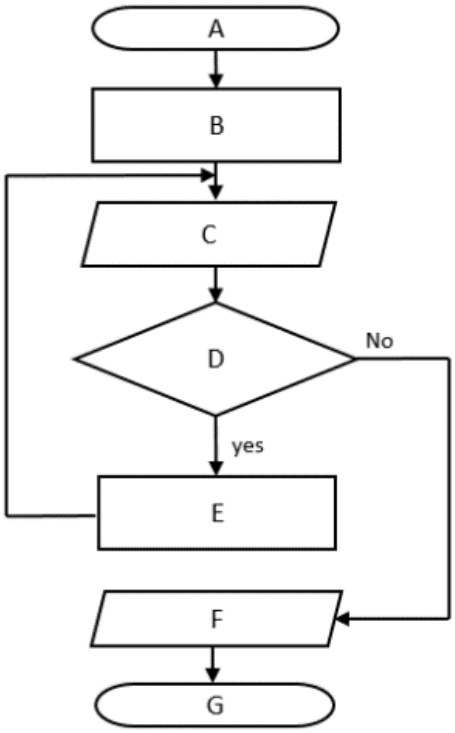
(b) In a school that has two houses namely Olu and Nelum, students are admitted to Olu House if the student admission number is an even number and to Nelum House if it is an odd number.
Each entry number starts with letters STU. (Eg: STU200, STU201 etc.)

Develop a Python program to output the house when a student's admission number is input.

Note - Assume that on each input the entire admission number is entered along with the letters, and then the program ignores STU and uses only the accompanying number to find the house, for calculations.
For example, when STU200 is input, the output should be Olu.

Part - B

(c) Here is a flowchart set up to output the sum of ten input numbers. Write the expressions that best match the labels 1 to 2 there. Write down the most suitable statements for labels A to G in it. A single process box in this flowchart can have one or more statements.



9. (a) Consider the following relational schema that shows the relationship between suppliers of goods and the goods they supply in a particular market. itemNo and supId are the primary keys of Item and Supplier relations respectively.

Item (itemNo, itemName, price)
Supplier (supId, supName, address)
Item_suplier (itemNo, supId, quantity)
Supplier_phone (supId, phoneNo)

Map all of the above relations to a correct Entity Relationship (ER) diagram.

(b) Consider the following database table.

Student_mark

St_id	Subject_code	Marks	Subject_name
S78452	ICT20	84	Information technology
S78569	ICT20	90	Information technology
S78452	ET85	75	Engineering technology
S78424	BST86	66	Bio Systems Technology

St_id + Subject_code is used to identify data uniquely in the above table.

(i) In which *normal form* does the above table exist? Explain reasons for it referring to the table.

(ii) Convert the above table to the next *normal form* (Writing data is unnecessary)

(iii) Answer the following questions assuming that the above tables are created in the database using SQL.

A - Write the SQL statement to display the different subject names.

B - If there are subject names containing part 'formation', then write the appropriate SQL statement to display all of them.

C - Write down the output of the following SQL statement.
SELECT * FROM Student_mark LIMIT 2 ORDER BY Marks;

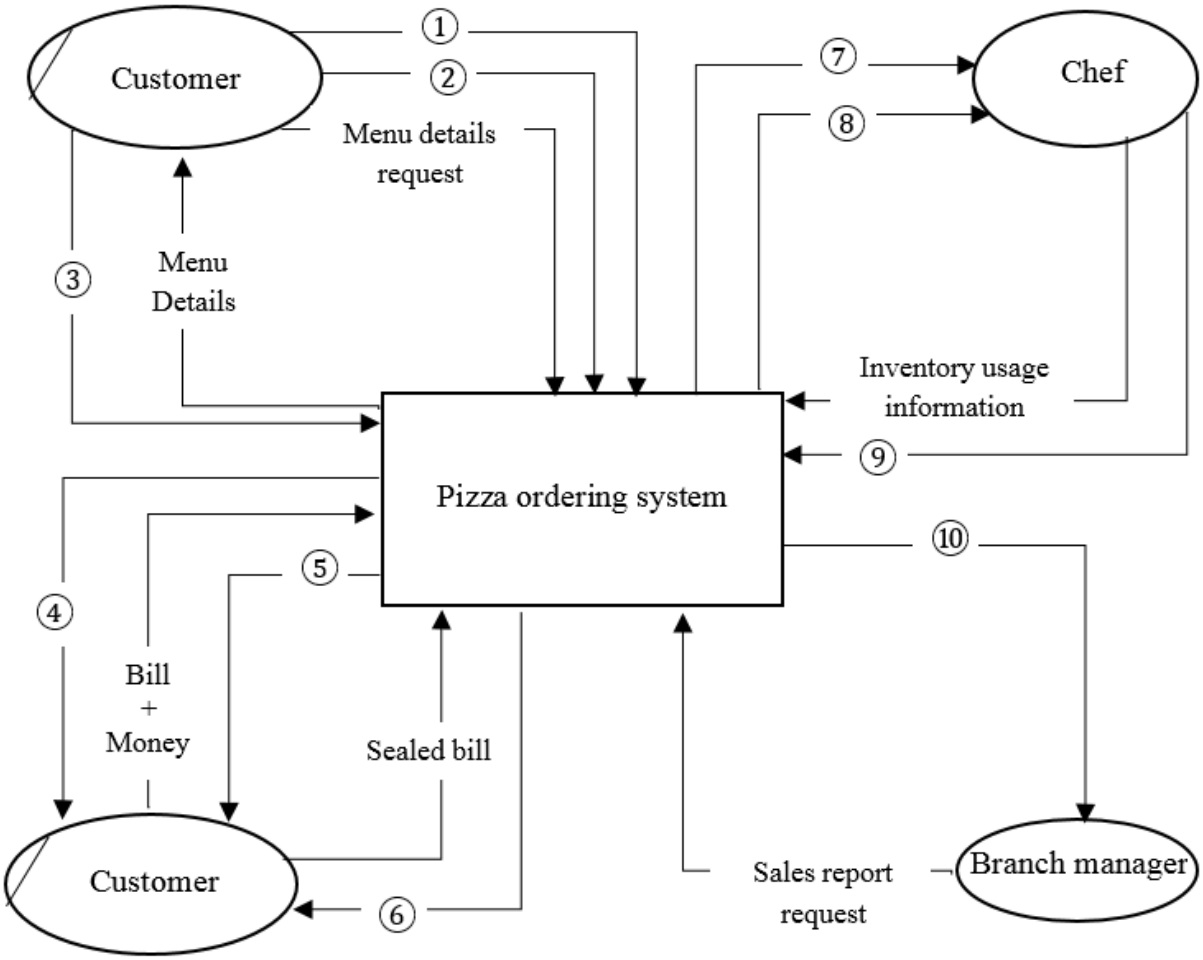
10. The activities taking place in the organization named *Pizza planet* are described below.

In the store named *Pizza planet*, the customers have to visit the store to pick up the order, though they can order pizza over the phone or by visiting the store. When ordering pizza, customers who are registered in that store should give their phone number to the store's telephone operator and new customers should register by giving their name, address and phone number.

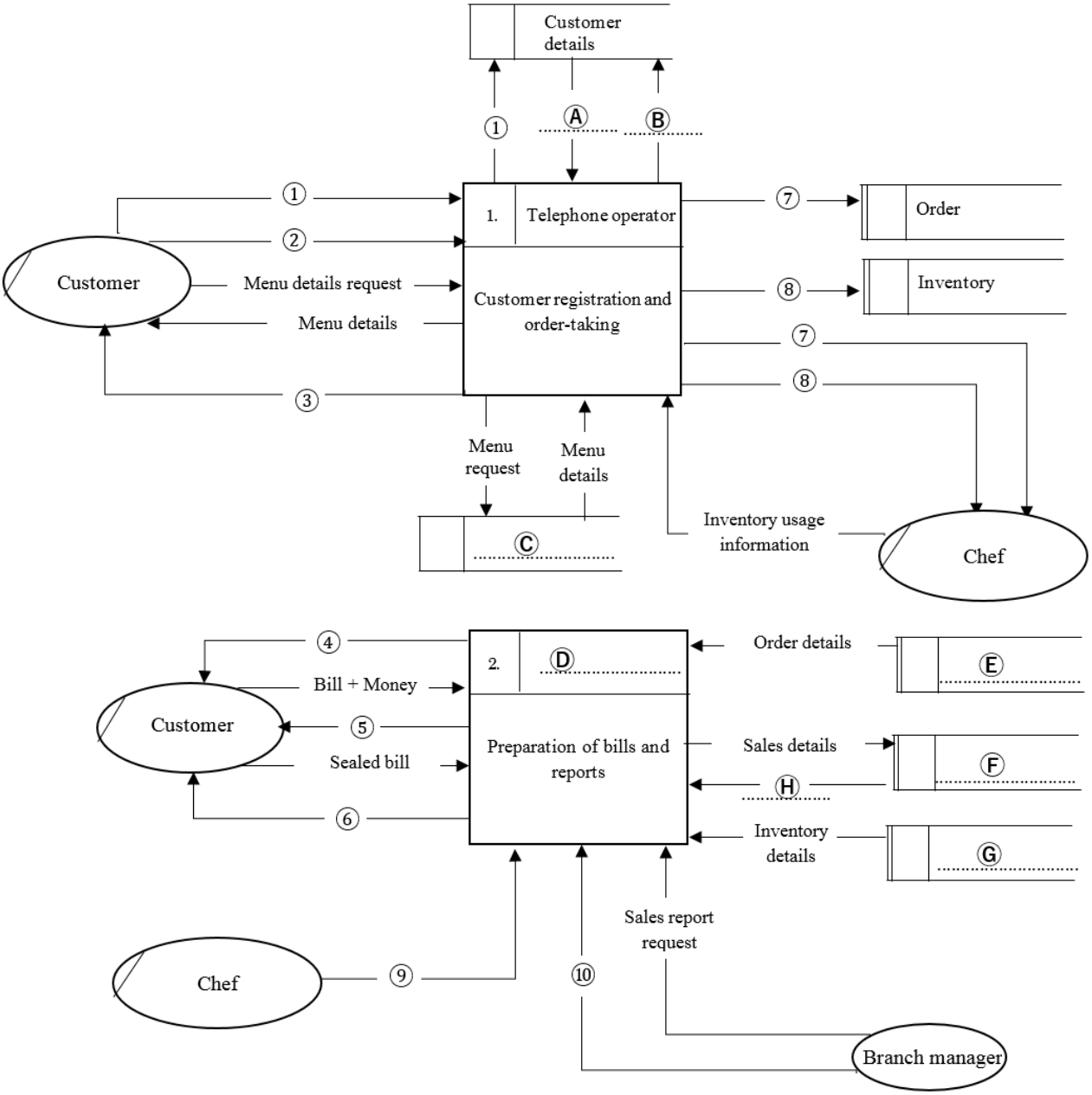
After that, when those customers request for the menu, the phone operator takes the menu details from the menu file and delivers it to their phone. Customer information is stored in a database and information about registered customers can be obtained when their phone number is provided. Information of new customers is stored there.

After the pizza order is received by the operator, the order is stored and the inventory of the required materials (spoon, fork, packing boxes, etc.) is updated by him. The inventory details and the pizza order are given to the kitchen chef who in turn gives the raw material information used from the inventory to the telephone operator to update the inventory. And the pizza processed according to the order is delivered to the cashier. The cashier checks the order register, gets the order details and issues the bill to the customer. After the customer gives the money and the bill, the sealed bill and the balance amount are returned to the customer. After receiving the pizza, prepared according to the orders, they are delivered after checking the bill by the cashier. The cashier updates the sales detail document. When the branch manager requests a sales report from the cashier, the cashier retrieves the inventory details, sales details, and order details from the files and prepares a sales report.

(a) The context diagram for the above activities is given below. Identify and write down the missing *data flow* details related to positions ① to ⑩.



(b) Level 1 of the DFD for the above context diagram is shown below. Identify and write down the relevant data flows and data stores against the labels Ⓐ to Ⓗ. (Some data stores are duplicated here)



(c) The branch manager of *Pizza planet* says that having an online pizza ordering system can increase its sales. Although the cashier suggests that a commercial-off-the-self-package is appropriate, the branch manager decides that a custom developed software system is better. Explain two possible reasons for the decision of the branch manager by comparing these two software packages.

(d) The following list consists of some of the functional, non- functional and other requirements that a proposed online pizza ordering system should have. Write down the labels of the *functional requirements* within the list.

A - The system should have a user friendly interface.
B - The system should work on any web browser.
C - Users should be given the opportunity to see the type, size and price of pizza.
D - 10% discount should be given for the first order on every new registration.
E - The system should authenticate user identity by phone number and password.
F - Customer information should be preserved in the case of a system crash.
G - The system should be protected from unauthorized access.