ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்

අ.පො.ස. (උ.පෙළ) විභාගය / க.பொ.த. (உயர் தர)ப் பரீட்சை - 2022 (2023)

විෂය අංකය
பாட இலக்கம் **20**

විෂය
பாடம் **Information and Communication Technology**

ලකුණු දීමේ පටිපාටිය / புள்ளி வழங்கும் திட்டம்
I පත්‍රය / பத்திரம் I

ප්‍රශ්න අංකය විනා இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.
01.	3	11.	2,4	21.	5	31.	1	41.	1
02.	5	12.	1	22.	3	32.	3	42.	5
03.	4	13.	4	23.	1	33.	4	43.	2
04.	1	14.	4	24.	4	34.	3	44.	2
05.	4	15.	1	25.	1	35.	1	45.	5
06.	5	16.	5	26.	2	36.	1	46.	2
07.	3	17.	5	27.	1	37.	2	47.	3
08.	3	18.	3	28.	2	38.	2	48.	4
09.	2	19.	4	29.	5	39.	1	49.	5
10.	5	20.	4	30.	3	40.	3	50.	4

○ විශේෂ උපදෙස් / விசேட அறிவுறுத்தல் :

එක් පිළිතුරකට / ஒரு சரியான விடைக்கு லகුණු 01 බැගින් / புள்ளி வீதம்

මුළු ලකුණු / மொத்தப் புள்ளிகள் 1 X 50

1 Paper II mark scheme

Notes

1. Essential keywords sufficient for credit in some answers are underlined.
2. Acceptable alternatives for a given word or set of words are separated by slashes.
3. ←-- *A* indicates that any credit for the item should be given only if A is correct.
4. Answers where *minor* spelling mistakes are acceptable are indicated. A minor spelling mistake is when
at most one character is either missing, wrong or in excess.
5. Rounding off of 0.5 marks should only be done to the **final total** for Paper II.

1. (a) | Draw the expected output of the given HTML code. | **[2]**

0.5 marks each for rows 1, 2, 3 and 4

Designation	Contact Telephone Numbers
Principal	061-2223211
	067-5557772
Vice Principal	061-5557771
Common Phone Number: 019-2233445	

Row 1: **0.5 marks**
Row 2: **0.5 marks**
Row 3: **0.5 marks**
Row 4: **0.5 marks**

NOTES:

▼ Row 1 content has to be in boldface.

★ Ignore minor spelling mistakes.

★ Ignore case and alignment defects.

★ Border in the table not essential.

★▼ The phone numbers need not be exact but must contain ten digits.

(b) | Rewrite the HTML code by applying internal CSS with grouping selectors. | **[2]**

```
<html>
  <head>
    <title>Cascading Style Sheets</title>

    <style>
      h1,h2 {color:blue;}   A: 0.5 marks
      h1   {text-align:center;}  B: 0.5 marks
    </style>

  </head>
  <body>
    <h1> Introduction to Cascading Style Sheets </h1>  C: 0.5 marks
    <h2> CSS can be applied to html documents in three different ways.</h2>
  </body>
</html>
```
D: 0.5 marks

ALTERNATIVE:

```
<html>
  <head>
    <title>Cascading Style Sheets</title>

    <style>
      h1 {color:blue; text-align:center;}
      h2 {color:blue;}
    </style>
```
A,B: 0.5 marks

```
  </head>
  <body>
    <h1> Introduction to Cascading Style Sheets </h1>  C: 0.5 marks
    <h2> CSS can be applied to html documents in three different ways.</h2>
  </body>
</html>
```
D: 0.5 marks

NOTES:

▼ For either A or B to be given credit, each must be included within <style> and </style> which in turn must be within <head> and </head>.

▼ For either C or D to be given credit, each must be included within <body> and </body>.

▼ Reduce a maximum of **0.5 marks** for all other mistakes.

(c) Fill the blanks in the HTML code to get the required output. **[4]**

```html
<html>
<head>Registration Form</head>
<body>
<h3> Registration for Examination </h3>

<form action="process.php" method="post">      A: 0.5 marks

<div>Student Name <input type='text' name="name"> </div>   B: 0.5 marks

<p>

  <div>
  Select Examination Module: <p>

  <input type='checkbox' name="module[]" value="ICT" /> ICT <br>
  <input type='checkbox' name="module[]" value="English" /> English <br>   C: 1 mark
  <input type='checkbox' name="module[]" value="IQ" /> IQ <br>
  </div>
  <br>
  <div>

  Preferred Medium:

  <input type='radio' name="language" value="Sinhala" checked /> Sinhala      E: 0.5 marks
  <input type='radio' name="language" value="Tamil" /> Tamil
  <input type='radio' name="language" value="English" /> English
  </div>
  <div>
  <br>
  Select Test Center:      D: 0.5 marks

  <select name="Center">
    <option value="Colombo" selected>Colombo</option>
    <option value="Matara">Matara</option>      G: 0.5 marks
    <option value="Jaffna">Jaffna</option>
  </select>                 F: 0.5 marks

  </div>
  <br>
  <input type="submit" name="submit" value="submit">
</form>
</body>
</html>
```

NOTES:

▼ Exact spelling required for **all** answers.

▼ In addition, exact case is required for the following:

- Student Name (in B)
- ICT, English, IQ (in C)
- Colombo, Matara, Jaffna (in G)

(d) | Fill the blanks in the PHP code. | **[2]**

```php
<?php

if ($_SERVER["REQUEST_METHOD"] == "POST") {
        $name = $_POST["name"];
        $medium = $_POST["language"];
        $center = $_POST["Center"];
}

echo "<h2> Your Input:</h2>";
echo $name; echo "<br>";
echo $medium; echo "<br>";
echo $center; echo "<br>";
?>
```

1 mark

1 mark

NOTE:

▼ Exact case and spelling required.

2. **(a)** **(i)** | ...if they did not skip the ... | **[1]**

මූලික විමර්ශනය

(ii) | solution developed by students lacks ... | **[1]**

ආර්ථික ශක්‍යතාව

(iii) | ...the library staff says they will only accept the solution only if ... | **[1]**

මෙහෙයුම් ශක්‍යතාව

NOTES:
▼ For all **i, ii, iii above**, ignore minor spelling mistakes.

(b) **(i)** | Write down most suitable terms for P, Q, R and S selecting from the given list. | **[4]**

1 mark for each:

P - ගනුදෙනුකරු

Q - ගෙවීම් ලදුපතේ පිටපත / ගෙවීම් ලදුපත

R - අයිතම විස්තර / ඉන්වෙන්ටරිය

S - වාර්තා ජනනය කිරීම / වාර්තා ජනනය

NOTES:
▼ Ignore case defects.
▼ Exact spelling needed.
▼ For P, ගනුදෙනුකරුවෝ/වන් is NOT acceptable.

(ii) | How many processes, external entities and data stores? | **[1]**

processes - 4   external entities - 2   data stores - 2

(c) (i) | Write down one difference between parallel and pilot deployment. | **[1]**

සමාන්තර ස්ථාපනයේදී, දැනට පවතින සහ නව යන පද්ධති දෙකම, යම් කාලයකට, සම්පූර්ණ පරිශීලක එකතුවම සඳහා, එකවර ක්‍රියාත්මක කෙරේ. නියාමක ස්ථාපනයේදී, මුලින්ම, පද්ධතිය තෝරාගත් පරිශීලකයන් පිරිසක් සඳහා පමණක් ක්‍රියාත්මක කෙරේ.

Provided the above key difference is mentioned, any **one** of the following differences is also acceptable:

Parallel	Pilot
Old and the new systems are run alongside each other for a period of time	Usually only the new system is run
Usually run covering the full set of users	Covers only a limited set of users
වියදම අධිකය	වියදම අඩුය
Comparatively quicker to implement	Takes longer to implement the entire system to cover the entire set of users
Duplication of effort to run both systems	Lesser duplication of effort
Less riskier as, if the new system fails, the old system still exists	More risky
ප්‍රතිපෝෂණයක් ලබාගැන්මට නියාමකයක ප්‍රතිඵල නැත	නියාමක ක්‍රියාත්මක කිරීමක ප්‍රතිඵල පද්ධති දියුණුවට යොදා ගත හැක
More effort required for training users as there are no users with prior experience	The users involved in the pilot can help train the other users
Viability (සාර්ථක බව) of the system not indicated before implementing for the whole set of users	Results from the pilot can help decide the viability of the system
If the new system does not work then big waste of money and effort	Relatively lesser money and effort wastage if the new system does not work
More difficult to manage as the implementation is on a larger scale	More easier to manage as the implementation is on a smaller scale
More cost involved in training as more staff need to be trained at once	Staff can be trained gradually from area to area
Users can can compare the output of the old system with the output of the new system, to ensure correctness	There is nothing to compare
Data could be different in the old and the new systems due to mistakes in data entry	No such risk
විශාල පරිමාණයෙන් ක්‍රියාත්මක කිරීමේ පරීක්ෂාව is automatically done	The system that works for a small area may not work for the entire area

(ii) | Write down one advantage of COTS software. | **[1]**

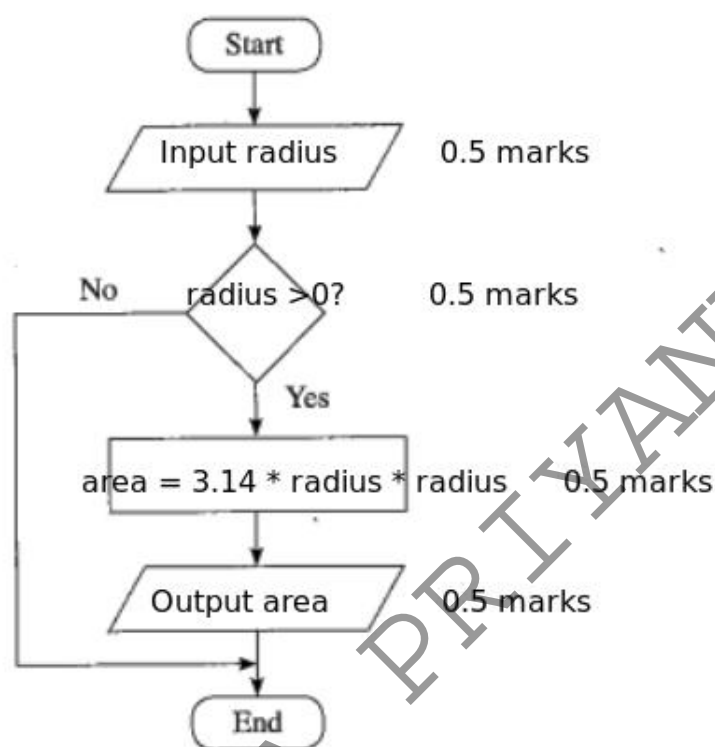**Any one** from the following:

- පහසුව
- ක්‍රියාත්මක කිරීමට අඩු කාලයක් ගතවීම
- නව තාක්ෂණයට වේගයෙන්/පහසුවෙන් අනුගත වීමේ හැකියාව
- අඩු වියදම
- අඛන්ඩ සහාය / යාවත්කාල කිරීම
- පහසුවෙන් ලබාගත හැකි පුහුණුවීම් සම්පත්
- පවතින ගනුදෙනුකාර ප්‍රජාව/පදනම
- පරීක්ෂා කළ හැකි සංස්කරණ පැවතීම
- දැනට භාවිත කරන පරිශීලකයන්ගෙන් ප්‍රතිචාර/අවවාද ලබා ගැනීමේ හැකියාව
- කාර්යයන්/විශේෂාංග විශාල සංඛ්‍යාවක් ඉදිරිපත් වීම
- ඇවැසි පරිදි වෙනස් කිරීමේ හැකියාව
- නොමිලේ/අඩු වියදමින් උත්ශ්‍රේණි කිරීමේ හැකියාව

3. (a) | Write down the content for the four flowchart components. | **[2]**

NOTES:

★ For "Input": any other word (or a programming language specific word) that conveys the meaning is acceptable. e.g., *get, read*

★ For "Output": any other word (or a programming language specific word) that conveys the meaning is acceptable. e.g., *display, print, show, write*

★ For condition: "Is <u>radius > 0</u>?" is also acceptable. For this mark scheme, the "?" in the condition can be considered as not essential. But in the future mark schemes it is likely for it to be considered essential as it increases the readability in a flowchart.

★ For computation: area $= \frac{22}{7} * radius^2$ is also acceptable.

★ Use of the π symbol is also acceptable.

★ Variable names: *radius* and *area* could be replaced with other variable names. But, they have to be correctly used in the rest of the flowchart.
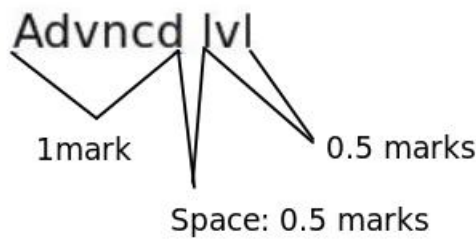
(b) | What is the output of the given Python code? | **[2]**

▼ Reduce 0.5 marks if the output is shown within quotes.

(c) | What code line(s) in Part (b) are to be removed to get "aeee" as the output? | **[2]**

Advncd lvl

1mark   0.5 marks

Space: 0.5 marks

```
pass
else:
```

NOTE:

▼ Exact output essential for the 2 marks. No partial marks allowed.

★ Give credit if students have indicated the above lines in any manner (e.g., through line numbers 5 and 6; through pointing using arrows etc.)

(d) Fill the eight blank spaces in the Python code to copy the content of a text file to another file. **[4]**

0.5 marks for each:

```
A = input("Enter the name of text file A")
B = input("Enter the name of text file B")

f1 = ..open... (A, ..'r'/'r+'..)

f2 = ..open... (B, 'w'/'a'/'r+')

for line in ...f1...... :

    f2.write (...line....)

f1.   close()

f2.   .close()..
```

NOTE:

★ To indicate file opening mode, double quotes also acceptable.

4. **(a)** Write down the most suitable items from the given list for the two blanks in the two sentences.
[**1**]

0.5 marks for each:

(i) මාර්ගගත ප්‍රතිවෙන්දේසි / online reverse auctions
(ii) e-වෙළඳපොළ / e-marketplace

NOTE:

★ Minor spelling mistakes acceptable.

(b) **(i)** What is the main disadvantage of purchasing computer hardware considering maximum demand? [**1**]

වැඩි කාලයක් සම්පත් අඩුවෙන් ප්‍රයෝජනයට ගැනේ

(ii) What is the alternative solution to overcome the disadvantage of b(i) but that still satisfies maximum resource demand? [**1**]

වළා පරිගනණය භාවිතය

(c) Select items from list for the two labels P and Q. [**1**]

0.5 marks for each:

P - ක්‍රමලේඛ ගණකය   Q - කාර්යබද්ධ ඒකකය / functional unit

NOTE:

★ Minor spelling mistakes acceptable.

(d) (i) | Complete the truth table for the given circuit. | **[2.5]**

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

Marks allocated as follows:

A: **1 mark** for correct X column

B: **1 mark** for correct Y column

C: **0.5 marks** for correct Q column ($\leftarrow$-- A, B)

(ii) | What is the basic logic gate that has the above truth table (inputs: A,B and output:Q)? |
[0.5]

OR gate

(e) | Write down the names of the layers indicated by P,Q,R,S,T and U. | **[3]**

0.5 marks for each:

P - යෙදුම් / <u>application</u> ස්ථරය

Q - ජාල / <u>Network</u> ස්ථරය

R - දත්ත සබැඳි / <u>Datalink</u> ස්ථරය

S - යෙදුම් / <u>application</u> ස්ථරය

T - ප්‍රවාහන / <u>Transport</u> ස්ථරය

U - අන්තර්ජාල / <u>Internet</u> ස්ථරය / ජාල / <u>Network</u> ස්ථරය

NOTE:

★ Ignore minor spelling mistakes.

5. (a) (i) | Draw the complete truth table for the given circuit. | **[3]**

P	Q	R	Z
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

The above total mark is decided as follows:

3 marks for all 8 rows correct
2.5 marks for maximum 6,7 rows correct
2 marks for maximum 3,4,5 rows correct
1 mark for maximum 1,2 rows correct

NOTE:

★ Having *Output* as the Z column title is acceptable.

▼ If the *Z* column is not labelled, or the label is different from *Z* / *Output*, **reduce 1 mark** from the earned total.

(ii) | Complete the Karnaugh map according to the given format. | **[2]**

0.25 marks for each correct cell:

		PQ			
		00	01	11	10
R	0	0	1	0	0
	1	1	1	1	0

(iii) | Using the K map, derive a simplified SOP expression for Z. | **[2]**

$$Z = \overline{P}Q + \overline{P}R + QR$$

Marks allocated as follows:

A: **1.5 marks** for marking the three loops on the correct Karnaugh map (**0.5 marks** for each)

B: **0.5 marks** for correct, simplified final SOP expression as $Z = \overline{P}Q + \overline{P}R + QR$ ($\leftarrow-- A$)

NOTE:

★ Zero cells not being indicated on the Karnaugh Map is permissible as the student has already been penalized for it in part (ii).

★ For component **B**, the term **Z** is not compulsory.

(b) (i) | Using Boolean algebra, show that ... is equivalent to BC+AC+AB. | **[2]**

METHOD I:

$\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$

$BC(\overline{A} + A) + A\overline{B}C + AB\overline{C}$

$BC + A\overline{B}C + AB\overline{C}$ $(A + \overline{A} = 1$ / Complement Law$)$ **1 mark**

$C(B + A\overline{B}) + AB\overline{C}$

$C(A + B) + AB\overline{C}$ $(A + \overline{A}B = A + B$ / Redundancy Law$)$

$CA + CB + AB\overline{C}$

$BC + A(C + B\overline{C})$

$BC + A(C + B)$ $(A + \overline{A}B = A + B$ / Redundancy Law$)$ **1 mark**

$BC + AC + AB$

METHOD II:

$\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$

$\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC + ABC + ABC$ $(A + A = A$ / Idempotent Law$)$ **1 mark**

$BC(A + \overline{A}) + AB(C + \overline{C}) + AC(B + \overline{B})$ **1 mark**
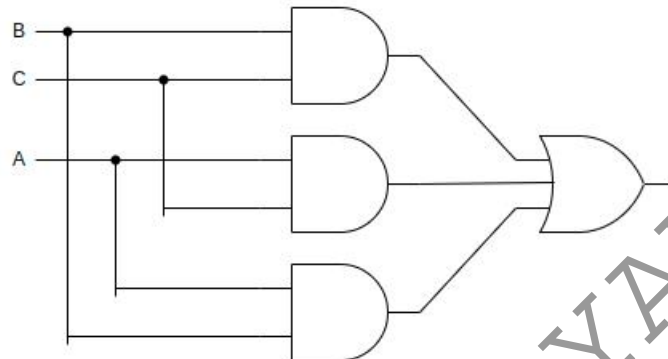
$BC + AB + AC$ $(A + \overline{A} = 1$ / Complement Law$)$

NOTE:
★ Stating the relevant laws not essential.

(ii) Draw a logic circuit for the above simplified expression by only using OR and AND gates.
[**3**]

NOTE:

▼ If on a correct circuit, the wire connections are not clearly indicated, then give
only a maximum of **2 marks**. The student can either indicate the connections
using dark dots (as shown in the diagram) or can can use halfcircles/cuts to
indicate non-connecting wires.

(iii) Draw a logic circuit for the above simplified expression by only using NAND gates. [**3**]
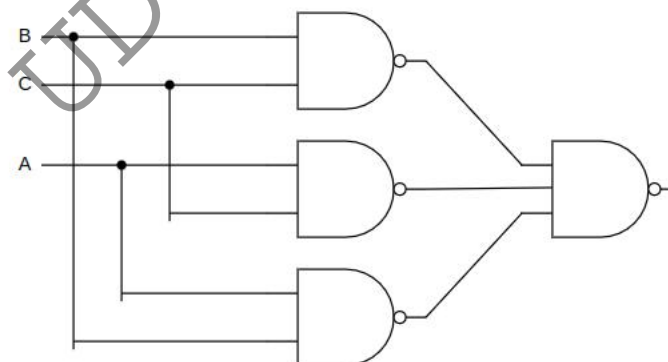
NOTES:

$$AB + BC + AC$$

$$= \overline{\overline{AB + BC + AC}} \qquad \text{(Double complement)}$$

$$= \overline{\overline{(AB)}\ \overline{(BC)}\ \overline{(AC)}} \qquad \text{(De Morgan's Law)}$$

▼ If on a correct circuit, the wire connections are not clearly indicated, then give
only a maximum of **2 marks**. The student can either indicate the connections
using dark dots (as shown in the diagram) or can can use halfcircles/cuts to
indicate non-connecting wires.

ALTERNATIVE:

If the final circuit is as follows, give **only 2 marks**
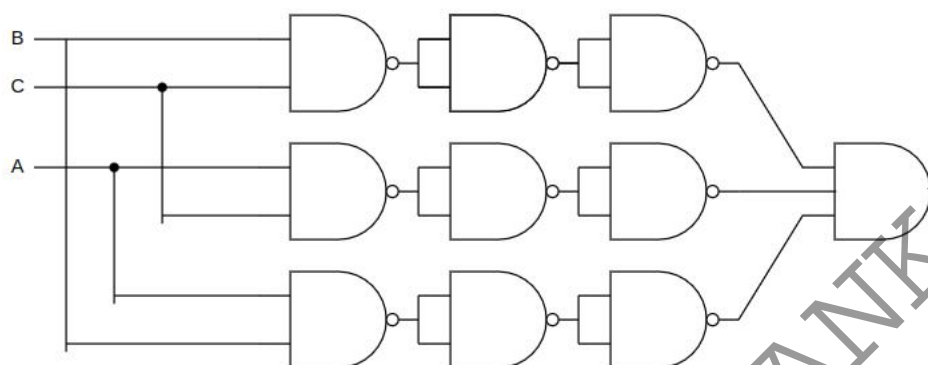
▼ If on the above diagram, the wire connections are not clearly indicated, then give only a maximum of **1 mark**. The student can either indicate the connections using dark dots (as shown in the diagram) or can can use halfcircles/cuts to indicate non-connecting wires.

6. (a) | Write suitable terms from P to U. | **[3]**

0.5 marks for each:

P - සමමිතික

Q - පොදු / එකම

R - අසමමිතික

| S | පොදු | පෞද්ගලික |
| T | පෞද්ගලික | පොදු |

U - කේතික පෙළ

NOTE:

★ Ignore minor spelling mistakes.

(b) (i) | Write the first and the last address in the given address block. | **[1]**

0.5 marks for each:

First address - 192.248.154.0

Last address - 192.248.154.127

NOTE:

ABC Company received 192.248.154.0/25. Each department can have at most 32 IP addresses. There are four departments. Therefore two bits are enough to identify them. We can extend /25 to /27. Balance five bits (32-27) would be sufficient to assign 32 different IP addresses in each subnet.

(ii) | Write the subnet mask of the given address block in dotted decimal notation. | **[1]**

255.255.255.128

(iii) | How many host bits are needed to create the required number of subnets? | **[1]**

<u>2</u> bits

(iv) | Fill the table. | **[4]**

Give **1 mark** for each row.

Subnet No	Network Address	Subnet Mask	First usable IP address	Last usable IP address	Broadcast address	
S001	192.248.154.0	255.255.255.224	192.248.154.1	192.248.154.30	192.248.154.31	1 mark
S002	192.248.154.32	255.255.255.224	192.248.154.33	192.248.154.62	192.248.154.63	1mark
S003	192.248.154.64	255.255.255.224	192.248.154.65	192.248.154.94	192.248.154.95	1 mark
S004	192.248.154.96	255.255.255.224	192.248.154.97	192.248.154.126	192.248.154.127	1 mark

(c) (i) | Write one difference between UDP and TCP. | **[1]**

Any **one** from the following:

- TCP විශ්වාසී බව ලබා දුනද, UDP එවැන්නක් නොමදේ.
- TCP සම්බන්ධතා මත පදනම් වුවද, UDP එසේ නොවේ.
- TCP සංකීර්ණ නියමාවලියක් වුවද, UDP එසේ නොවේ.
- TCP සේවාදායක/සේවායෝජක සන්නිවේදන සඳහා සුදුසුමුත්, UDP විමසුම් මත පදනම්වූ සන්නිවේදන සඳහා සුදුසුවේ.
- TCP පිළිවෙළින් ලබාදීම සහතික කරන මුත්, UDP එසේ නොවේ.
- TCP තදබදය පාලනය කරන මුත්, UDP එසේ නොකරයි.
- TCP වේගවත් මුත්, UDP එසේ නොවේ.

(ii) | Write down two main functions of a router. | **[2]**

Any **two** from the following with **1 mark** for each:

- ආරම්භයෙන් අවසානයට දත්ත මාර්ගගත කිරීම
- පැමිණෙන දත්ත/පැකට්ටු සඳහා මං සෙවීම
- අනෙකුත් මං හසුරු/රවුටර සමහ සන්නිවේදනය/සහයෝගය
- තමා වෙතින් යා හැකි ගමනාන්ත පිළිබඳව වගුවක් පවත්වා ගැනීම
- වරින් වර, අනෙකුත් මං හසුරු/රවුටර සමහ මාර්ගගත කිරීම් වගු (routing tables) බෙදාගැනීම
- අනෙකුත් මං හසුරු/රවුටර වෙතින් ලද තොරතුරු මත, මාර්ගගත කිරීම් වගු (routing tables) යාවත්කාලීන කිරීම
- විවිධ ජාල අතර සම්බන්ධතාව ගොඩනැගීම

(d) (i) | What is the functionality of a DNS server? | **[1]**

Any **one** from the following:

- දෙනුලබන වසම් නාම සහ වෙබ් ලිපින සඳහා නාමාවලි සෝදිසි සේවාව ලබාදීම
- දෙනු ලබන ඒකාකාරී සම්පත් නිශ්චායකයක් (URL එකක්) සඳහා ගැලපෙන වෙබ් ලිපියක් සෙවීම් සේවාව, HTTP, SMTP නියමාවලි වෙත ලබාදීම
- වසම් නාම නිශ්චය
- වසම් නාමය IP ලිපිනයට ගැලපීම
- පුතිවර්ත DNS සෝදිසිය / විරුද්ධ අතට DNS සෝදිසිය

(ii) | What is the functionality of a DHCP server? | **[1]**

Any **one** from the following:

- ජාලයකට එකතුවන උපාංග වලට IP යොමු / ලිපින ලබාදීම
- යම් කාල සීමාවකට, IP යොමු / ලිපින ලබාදීම

7. **(a)** **(i)** | Match A,B,C. | **[3]**

1 mark for each:

A - පාලකය / <u>Controller</u>

B – ක්ෂුද්‍ර පාලකය / ආඩ්‍යුනෝ පුවරුව

C – සංවේදකය / <u>Sensor</u>

(ii) | Explain why arrow M is shown in a single direction. | **[1]**

සංවේදකයට, පද්ධතියට/ක්ෂුද්‍ර පාලකයට දත්ත යැවීම පමණක් කළ හැකිය.

(b) | Write down X,Y and Z in the algorithm. | **[3]**

1 mark for each:
X - M_L < 8
Y - කරාමය <u>විවෘත කරන්න</u>
Z - කරාමය <u>වසන්න</u>

(c) | What could be monitored in the warehouse using an LDR sensor? | **[1]**

දීප්තිය / දීප්ති මට්ටම / ආලෝක තීව්‍රතාව / ආලෝක තීව්‍රතා මට්ටම

NOTE:

▼ Writing only ආලෝකය is **not** sufficient.

(d) (i) | Who are the self-autonomous agents? | **[1]**

0.5 marks for each:

ඒජන්ත 2 සහ සෙවුම් ඒජන්ත

NOTE:
▼ **Zero marks** if all three agents are named.

(ii) | Explain Q and S interactions. | **[2]**

1 mark for each:

- Q - ඒජන්ත 1, ඡායාරූප පිරික්සීමට ඒජන්ත 2 මුදාහරියි; විෂමතාවක් හසුවූ විට ඒජන්ත 2, ඒජන්ත 1ට දන්වයි
- S - ඒජන්ත 2, අවශ්‍ය නම් සෙවුම් ඒජන්තව මුදාහරියි; සෙවුම් ඒජන්ත සෙවීම් ප්‍රතිඵල ඒජන්ත 2ට ලබාදෙයි

(iii) | Main disadvantage of removing search agent. | **[1]**

අදාල තොරතුරු වල නවතම යාවත්කාලීන කිරීම් වලින් පද්ධතිය හුදෙකලා වේ /
පද්ධතිය යල්පිනූ දැනුම් ගබඩාවක් වේ

(e) (i) | One advantage of limiting sales to the nearby community. | **[1]**

Answer could be any **one** of the following:
- තරක් වෙන භාණ්ඩ පහසුවෙන් කළමණාකරනය කිරීමට හැකිවීම
- බෙදාහැරීම් වියදම අඩුවීම
- භාණ්ඩවල තත්ත්වය/නැවුම් බව තහවුරු කිරීමේ පහසුව

(ii) | Alternative payment method until an online payment facility is setup. | **[1]**

Any **one** of the following:
- භාණ්ඩ ලැබෙන විට මුදල් ගෙවීම
- බැංකු හරහා හුවමාරුවක්
- ගිනුමට තැන්පතුව / ගිනුමට තැන්පතුවක් එලය ලෙස ලැබෙන සමාන ක්‍රමයක්

(iii) | Give one advantage of this value addition to his e-business. | **[1]**

Any **one** of the following:

- භාණ්ඩය තරක්වීම පමා කිරීම
- භාණ්ඩයේ රාක්ක කාලය වැඩි කිරීම
- දුරස්ථ පාරිභෝගිකයන්ට සම්බන්ධ වීමේ හැකියාව
- වඩාත් හොඳ බෙදාහැරීම් සම්පාදනය
- වෙළෙඳපොල ඉල්ලුම සහ සැපයුමේ වඩාත් හොඳ පාලනයක් ලබා ගැනීම

8. **(a)** **(i)** | What is the output of the Python script if 1002 is given as the input? | **[2]**

3

(ii) | The modification required for the B = B + C code line if the reverse of a given positive number is to be printed? | **[2]**

B= B*10 + C

(b) | Write a Python function called *Party()* that takes the student name and name of the food item as parameters. The function should return *True* or *False* depending on whether the student is allowed to bring that food item or not. |

[5]

METHOD 1:
```python
def Party(studentName, foodItem):
    if ((studentName[0]==foodItem[0]) and
            (studentName[len(studentName)-1] == foodItem[len(foodItem)-1])):
        return "True"
    else:
        return "False"
```

METHOD 2:
```python
def Party(name, food):
    if name[0] ==food[0] and name[-1] == food[-1]:
        a = "True"
    else:
        a = "False"
    return a
```

METHOD 3:
```python
def Party(name, food):
    a = "False"
    if name[0] ==food[0]:
        if name[-1] == food[-1]:
            a = "True"
    return a
```

Methods 4 and 5 have been added.

METHOD 4:

```
def Party(studentName, foodItem):

    return studentName[0] == foodItem[0] and
            studentName[len(studentName)-1] == foodItem[len(foodItem)-1]:
```

METHOD 5:

```
def Party(studentName, foodItem):

    return studentName[0] == foodItem[0] and
            studentName[-1] == foodItem[-1]:
```

Allocate marks as follows:

A: **1 mark** for def Party(studentName, foodItem):

B: **1 mark** for the *first letter check* (within *if* for methods 1-3) (←-- *A*)

C: **1 mark** for the *last letter check* (within *if* for methods 1-3) (←-- *A*)

D: **1 mark** for correct:

     logic (e.g., *and* in the if statement)

     use of *:* (at relevant places)

     indentation

     (←-- *B, C*)

E: **1 mark** for correct *return/print* statement (←-- *D*)

NOTE:

★ Following are acceptable:

- For METHOD 1: instead of the two *return* statements, the use of print("True") [or print(True)] and print("False") [or print(False)] respectively
- For METHOD 2 and METHOD 3: instead of the *return a* statement, the use of *print(a)*

★ Ignore the case of *True, False* in methods 1-3.

★▼ *True, False* can also be returned without quotation marks as in *return True, return False.* Then, however, the exact case of *True, False* are important.

(c) Write down A-H statements in the flowchart to calculate the factorial of a given positive integer. **[6]**

METHOD 1:

Label	Answer	Marks
A	Start / Begin	**0.5**
B	Read / Input / Get n	**0.5**
C	$i = 1 \quad fac = 1$	**1**
D	$i <= n$?	**1**
E	$fac = fac * i$ (in Yes branch)	**1**
F	$i = i + 1$	**1**
G	Print / Display / Write /Show fac (in No branch)	**0.5**
H	Stop / End / Finish	**0.5**

METHOD 2:

Label	Answer	Marks
A	Start / Begin	**0.5**
B	Read / Input / Get n	**0.5**
C	$fac = 1$	**1**
D	$n > 0$?	**1**
E	$fac = fac * n$ (in Yes branch)	**1**
F	$n = n - 1$	**1**
G	Print / Display / Write /Show fac (in No branch)	**0.5**
H	Stop / End / Finish	**0.5**

METHOD 3:

Label	Answer	Marks
A	Start / Begin	**0.5**
B	Read / Input / Get n	**0.5**
C	$i = 1 \quad fac = 1$	**1**
D	$i > n$?	**1**
E	$fac = fac * i$ (in No branch)	**1**
F	$i = i + 1$	**1**
G	Print / Display / Write /Show fac (in Yes branch)	**0.5**
H	Stop / End / Finish	**0.5**

METHOD 4:

Label	Answer	Marks
A	Start / Begin	**0.5**
B	Read / Input / Get n	**0.5**
C	$fac = 1$	**1**
D	$n <= 0$?	**1**
E	$fac = fac * n$ (in No branch)	**1**
F	$n = n - 1$	**1**
G	Print / Display / Write /Show fac (in Yes branch)	**0.5**
H	Stop / End / Finish	**0.5**

9. **(a)** Draw the ER diagram for the given scenario.   [8]

A sample answer for ER diagram:
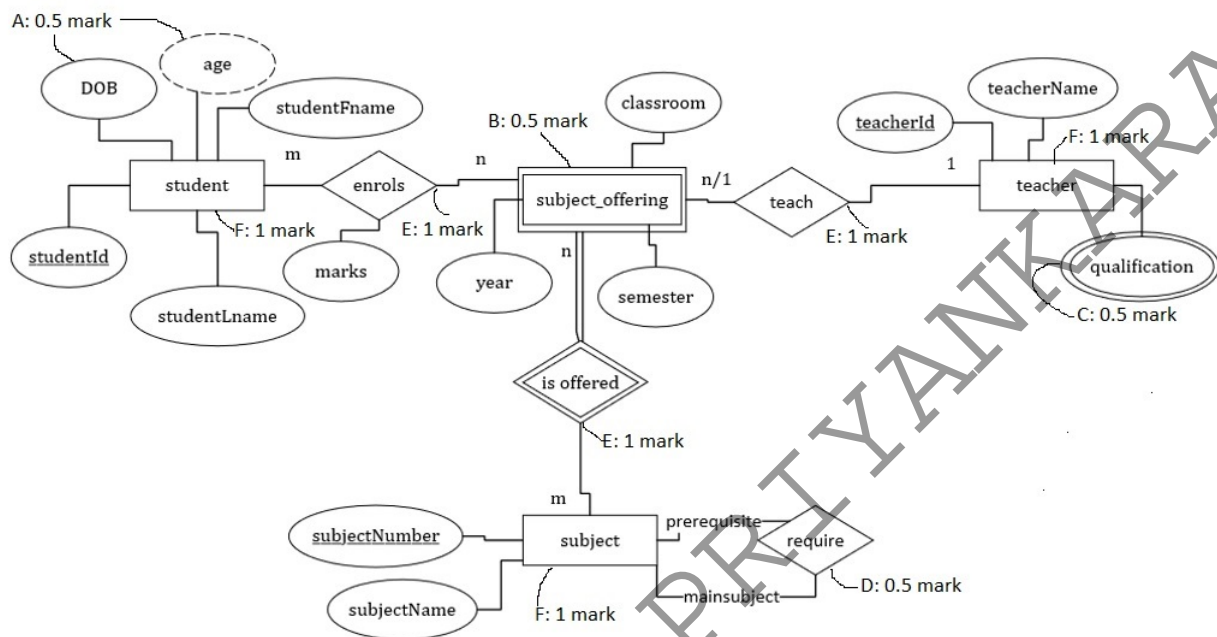
Marks allocated as follows:

A: **0.5 marks** for identifying *DOB* as an attribute and *age* as a derived attribute of *student* entity

B: **0.5 marks** for *subject_offering* as a weak entity

C: **0.5 marks** for *qualification* as a multi-valued attribute

D: **0.5 marks** for identifying correctly the prerequisite subject relationship

E: **3 marks** for identifying relationships with correct cardinality (**1 mark** for each relationship)

F: **3 marks** for identifying entities with correct sets of attributes (at least 2 or more attributes for *student, teacher* and *subject* entity)

NOTE:

★ studentFname and studentLname can connect to studentName attribute for the latter to be represented as a composite attribute.

(b) (i) | Write down the output of the given SQL statement. | **[1]**

FullName	Salary
Upul Fernando	44000
Sunil Perera	115000
Kamala Gamage	52000
Upul Fernando	44000
Saman Perera	140000
Kamala Gamage	52000

NOTE:
▼ Rows and order of the records important.
★ Ignore minor spelling defects.

(ii) | Write an SQL statement to display the names of employees who are assigned to project P04. | **[2]**

```
SELECT Employee.FullName
FROM Employee, Assign_Project
WHERE Employee.EmployeeId = Assign_Project.EmployeeId AND ProjectId = ' P04';

OR

SELECT Employee.FullName
FROM Employee INNER JOIN Assign_Project ON Employee.EmployeeId =
Assign_Project.Employee_Id
WHERE Assign_Project.Project_Id="P04";

OR
SELECT E.FullName
FROM Employee as E INNER JOIN Assign_Project as A ON E.EmployeeId = A.Employee_Id
WHERE A.Project_Id="P04";
```

Marks allocated as follows:
   A: **1 mark** for correct SELECT and FROM clauses
   B: **1 mark** for correct WHERE clause

(iii) | In which normal form does the **Assign_Project** table exist? | **[1]**

පළමු ප්‍රමත අවස්ථාවේ / <u>First</u> normal form / <u>1</u> NF

(iv) | What needs to be done to convert the **Assign_Project** table into its next normal form? Justify answer. | **[1]**

Answer	Marks
<u>PName</u> සහ <u>Description</u> ලාක්ෂණික <u>ProjectId</u> ලාක්ෂණිකයද සමහ ඉවත් කළ යුතුය	0.5
මෙම ලාක්ෂණික <u>පුාථමික යතුර</u> මත <u>ආංශිකව පරායත්ත</u> වන නිසා	0.5

ALTERNATIVE:

Answer	Marks
<u>ආංශික පරායත්තතා ඉවත් කිරීම</u>	0.5
PName සහ Description ලාක්ෂණික *ProjectId* ලාක්ෂණිකය <u>මත යැපේ</u>	0.5

(v) | Give an example query where the update anomaly can occur in the Assign_Project table. | **[2]**

The following examples have been amended:

```
UPDATE Employee
SET EmployeeId = 'E003'
WHERE EmployeeId = 'E002';
```

Note: EmployeeId can be any valid EmployeeId from the Employee table.

OR

<u>Update only some rows in the Assign_Project table, that leads to the inconsistency of the table</u>

```
UPDATE Assign_Project
SET PName = 'SalesSys'
WHERE EmployeeId = 'E008';
```

OR

```
UPDATE Assign_Project
SET Description = 'Inventory System'
WHERE EmployeeId = 'E008';
```

Note: Different EmployeeId values can be considered based on the values given in the Assign_Project table.

Marks allocated as follows:
A: **1 mark** for correct UPDATE and SET clauses
B: **1 mark** for correct WHERE clause

10. **(a)** Write down the important work that OS does with respect to P_w and P_T during the time period O. [4]

Marks allocated as follows:

A: **2 marks** for any **one** of the following:

- P_w නැවැත්වීම
- P_w ට අදාළව සකසනය පවතින අවස්ථාව/තත්ත්වය එහි PCB හි ගබඩා කිරීම
- P_w හි තත්ත්වය සුදානම් / READY බවට වෙනස් කිරීම

B: **2 marks** for any **one** of the following:

- P_T ආරම්භ කිරීම
- P_T සඳහා PCB එකක් පැවරීම / P_T පැවති තත්ත්වය එහි PCB එකෙන් ලබා ගැනීම (ප්‍රවේශනය කිරීම)
- P_T ට අදාළ පිටුව මතකයට ප්‍රවේශනය කිරීම / ගෙන ඒම
- P_T හි තත්ත්වය ``ධාවනය වන'' / ක්‍රියාත්මක / RUNNING බවට වෙනස් කිරීම

If the student had written just ``සන්ධර්භ ස්විචය'' then give a total of **2 marks**.

(b) Why is W less than Q? [1]

P_w යම් සිදුවීමක් වනතුරු (උදා. ආදාන/ප්‍රතිදාන) අවහිර කිරීම / අත්හිටුවීම

(c) If virtual address 0001 0000 0000 0011 is present in physical memory, then write down its 15 bit physical address. [4]

Marks given as follows:

If answer is "ඔව්": 101 0000 0000 0011 **4 marks**

The marks allocated as follows:

A: **1 mark** for ඔව්

B: **3 marks** for the නිවැරදි ලිපිනය

If answer is ``නැත'': **2 marks** for an answer containing the following:

(i) The OS picks either:
- a free frame or
- a little used page frame and writes its contents back to disk (if needed)

(ii) fetches the page just referenced into the page frame just freed

(iii) changes the page table

(iv) restarts the instruction

The 2 marks for a "No" answer are allocated as follows:

A: **0.5 marks** for හිස් රාමුවක් තේරීම (හෝ එකක් හිස් කිරීම)

B: **0.5 marks** for අවැසි පිටුව ගෙන ඒම

C: **0.5 marks** for පිටු වගුව වෙනස් කිරීම

D: **0.5 marks** for උපදෙස නැවත ආරම්භ කිරීම

(d) | Give two reasons for a process page to be not in memory. | **[2]**

1 mark for each:

- පුථම වරට කුමලේඛ පිටුව අවැසි වීම
- පිටුව භෞතික මතකයේ කලින් තිබුනද, වෙනත් පිටුවකට ඉඩ ලබාදීමට එය ඉවත් කර ඇත / පිටුව පුතිහරණය කර ඇත
- කියායනය අවසන් වී ඇත

(e) | Explain how OS finds the blocks in a file. | **[4]**

(i) contiguous allocation: **2 marks**
   Marks allocated as follows:
   A: **1 mark** - නාමාවලි තොරතුරේ ගොනුවේ පළමු බණ්ඩය දක්වයි
   B: **1 mark** - බණ්ඩ එකිනෙකට යාබදව පිහිටයි / නාමාවලි තොරතුරේ ගොනුවේ බණ්ඩ ගණනද දක්වයි

(ii) indexed allocation: **2 marks**
   Marks allocated as follows:
   A: **1 mark** - නාමාවලි තොරතුරේ ගොනුවේ සුවක බණ්ඩය දක්වයි
   B: **1 mark** - එම බණ්ඩය ගොනුවේ අන් සියලු බණ්ඩවල යොමු දක්වයි