ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீ **Department of Examinations, Sri Lanka** திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department **Examinations, Sri Lanka** Department of Examinations, Sri Lanka
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கை **Department of Examinations, Sri Lanka** திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2016 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2016 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2016

තොරතුරු හා සන්නිවේදන තාක්ෂණය	II		පැය තුනයි
தகவல், தொடர்பாடல் தொழினுட்பவியல்	II	20 E II	மூன்று மணித்தியாலம்
Information & Communication Technology	II		*Three hours*

Index No. : ....

Important :

* *This paper consists of **06** pages.*

* *This question paper comprises of two parts,* **Part A** *and* **Part B**. *The time allotted for* **both parts** *is* **three hours**.

* *Use of calculators is **not** allowed.*

Part A - Structured Essay :
(pages 2 - 4)

* *Answer **all** the questions **on this paper itself**. Write your answers in the space provided for each question. Note that the space provided is sufficient for your answers and that extensive answers are not expected.*

Part B - Essay :
(pages 5 - 6)

* *This part contains **six** questions, of which, **four** are to be answered. Use the papers supplied for this purpose.*

* *At the end of the time allotted for this paper, tie the **two parts together** so that **Part A** is **on top** of **Part B** before handing 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

	For the Second Paper	
Part	**Question Nos.**	**Marks**
A	1	
	2	
	3	
	4	
B	1	
	2	
	3	
	4	
	5	
	6	
	Total	

Final Marks

In numbers	
In words	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Marks checked by :	
Supervised by :	

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

1. (a) State the operation of each HTML code segments given below. Assume that all images and HTML documents are in the same folder.

(i) Cover Page

....

....

....

(ii) Content

....

....

(iii)

....

....

....

(b) Which of the three mechanisms used to apply styles to HTML elements increases the maintainability of a web site?

....

(c) Consider the following HTML code segment:

```
<body>

    <h2>How web search engines work</h2>
    <p>A search engine maintains three processes.
    </p>
</body>
```

Write the internal styles required to apply the following styles for the elements in the above code segment.

Element	Property	Style
h2	Colour	Red
	Text	Centre aligned
P	Font	Courier New, 14 points high

....

....

....

....

....

....

....

....

2. Assume that the camera you have been using so far is no longer needed since you have received a latest camera as a gift. A friend suggested that your old camera could be sold on the Internet. Consequently, you were able to sell the camera to a buyer in an African country through a web site. You received the payment made by the buyer through a service like Paypal.

(a) State an example for each C2C and B2C e-commerce types with respect to the above transaction.

C2C: ....

....

....

B2C: ....

....

....

(b) Why is a service like Paypal necessary for this type of transactions?

....

....

....

....

(c) Some Internet users are reluctant to buy goods online from individual sellers. State **two** reasons for this reluctance and give an example for each.
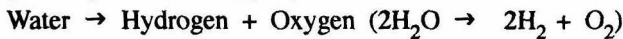
(1) ....

....

....

(2) ....

....

....

3. (a) A space station generates oxygen required for its astronauts by 'splitting' water (H_2O) into Hydrogen (H_2) and Oxygen (O_2) using electricity supplied by batteries in the space station. This process is given by the following equation.

Water → Hydrogen + Oxygen ($2H_2O \rightarrow 2H_2 + O_2$)

Carbondioxide (CO_2) breathed out by astronauts and Hydrogen (H_2) generated from the above process are combined together to generate Water and Methane, as given by the following equation.

Hydrogen + Carbondioxide → Water + Methane ($4H_2 + CO_2 \rightarrow 2H_2O + CH_4$)
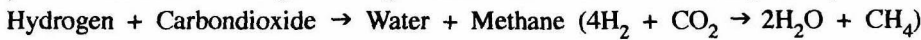
Generated Methane is removed by charcoal filters.

State whether the system described above is open or closed. Give **two** reasons for your answer.

....

(1) ....

....

(2) ....

....

(b) State **two** possible problems faced by an information system having a relational database in zero normal form.

(1) ....

....

....

(2) ....

....

....

(c) Assuming that the human brain is a system, compare and contrast a human brain and a computer based information system.

....

....

....

....

....

....

4. (a) Consider the following Python program:

```
#Print the sum of integers from 1 to 5 (including 1 and 5)
total = 0
i = 1
while (i <= 5):
        total = total + i

i = i + 1
print (total)
```

(i) What would be the output of the above program when executed? Justify your answer.

....

....

....

....

....

(ii) Modify and rewrite the above program, **without increasing** the number of statements, to compute the sum of integers from 1 to 10 (including 1 and 10).

....

....

....

....

....

....

....

(b) An embedded system uses 16-bit wide address bus to access its byte addressable main memory. What is the maximum usable size of its main memory? Show your computations clearly.

....

....

....

....

....

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2016 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2016 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2016

තොරතුරු හා සන්නිවේදන තාක්ෂණය	II		20 E II
தகவல், தொடர்பாடல் தொழினுட்பவியல்	II		
Information & Communication Technology	II		

Part B

✳ Answer any *four* questions only.

1. The top secret recipe for making milk rice at the restaurant chain SLFC is kept in an electronic safe at their head office. The lock (L) of the safe can either be in locked or unlocked states represented by logical truth values 0 and 1 respectively. This lock has three different key holes K1, K2 and K3 each with a unique key. These three keys are in the custody of three directors of SLFC. The lock opens when **at least two keys** are inserted into the corresponding key holes. The situation where the corresponding key is properly inserted into any key hole is represented by the logical truth value 1 and all the other situations are represented by the logical truth value 0.

   Assuming that only the following Integrated Circuits (ICs) are available, construct a logic circuit to operate the lock (L) of the safe, by using the truth tables and Boolean algebra. Clearly show the truth tables, Boolean expressions and the Boolean algebraic rules used to construct your circuit.
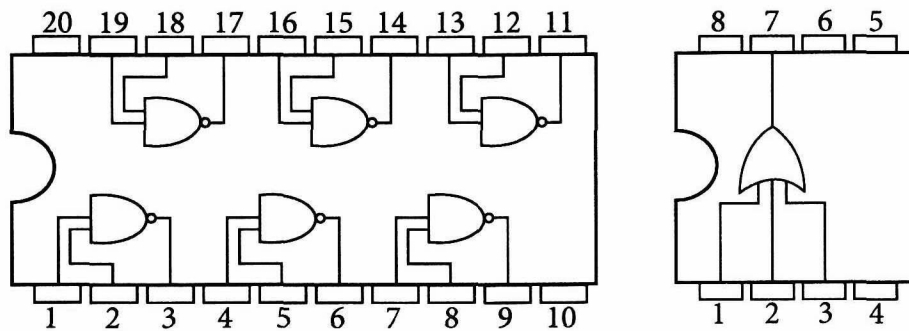
2. There are two Local Area Networks (LANs) L1 and L2 which are connected only by a router R. These LANs are not connected to any other networks. Machines P and Q are connected to LANs L1 and L2 respectively. The machine P has successfully delivered an IP packet IP1 to machine Q.

   In a LAN, an IP packet is sent from the source device to the destination device by inserting it into a frame, generated in the data link layer at the source device. In that LAN, source and destination devices are uniquely identified by the MAC addresses in that frame.

   An IP address is recognized by the network layer but it is not recognized by the data link layer.

   (a) Draw a network diagram to depict the network described above using commonly used symbols and notations.

   (b) State whether the destination IP address of the packet IP1 is the IP address of Q or R when it is going through LAN L1. Justify your answer.

   (c) Assume that the IP packet IP1 was in a frame F2 in LAN L2. State whether the source MAC address of frame F2 is the MAC address of P or R. Justify your answer.

3. The management of the Siri Lak bank has decided to develop a web portal to deliver personalized services to its employees. The services include, access banking plans, regulations and policies, register for learning opportunities provided by the bank, quick search, weather reports, communicate with other employees and leave and loan related services. According to the chief information officer of the bank, the primary goal of developing the portal is to enable its employees to manage their personal lives more easily.

   (a) What is the e-commerce type of the services provided by the above web portal? Justify your answer.

   (b) State **two** potential benefits obtainable to the employees from the above portal.

   (c) The management of the bank expects that they could get a better service from their employees after implementing the proposed portal. Do you agree with this idea? Justify your answer.

   (d) A consultant suggests to implement a 'personal user assistant agent' based on the intelligent agent technology to improve the services of the above web portal. State **three** possible ways to improve the services of the above web portal by such an agent.

4. A canteen of a school sells 10 different types of foods. These food types are placed in a shelf. Students can select foods while walking alongside the shelf and keep them on a tray. These trays are available at the entrance of the canteen. A student, after selecting the food, should proceed to the cashier with the food tray for the payment.

   You are asked to develop a computer program to calculate the payment due for a food tray. For this purpose, each food type is given a unique integer from 1 to 10.

   The integer value assigned for each food type and its unit price is shown in the following table.

Food type	1	2	3	4	5	6	7	8	9	10
Unit price (Rs)	10.00	12.00	15.00	10.00	25.00	45.00	50.00	25.00	10.00	12.00

   (a) State all the inputs required for the computer program and its expected output.

   (b) Draw a flowchart to represent the algorithm required to compute the payment due for a food tray.

   (c) Transform the above flowchart into a Python program.

5. An education institute maintains a timetable to manage its lectures, practical classes and seminars. The timetable consists of two hour time periods: 8.00 a.m. - 10.00 a.m., 10.00 a.m. - 12.00 noon, 1.00 p.m. - 3.00 p.m. and 3.00 p.m. - 5.00 p.m. Lectures, practical classes and seminars are assigned to one or more time periods. A lecture is assigned to a lecturer and a practical class is conducted by a group of demonstrators. At least two lecturers are responsible for a seminar.

   Draw an Entity Relationship (ER) diagram for the above system. State all your assumptions clearly.

6. Draw a context diagram to show the operations of the online assignment management system described below adhering to the standards of the Structured System Analysis and Design Methodology (SSADM). Clearly indicate external entities and data flows of your diagram. State any assumptions that you have made.

   The National University of ICT (NUICT) conducts distance learning programs. The students of NUICT are continuously assessed through online assignments. The students of NUICT use an online assignment management system called NetAssign to download assignments and upload answer scripts. The examiners use NetAssign to upload assignments and to download answer scripts. Once the answer scripts are marked, the examiners enter marks into NetAssign. The students can view only the grades determined by NetAssign. To use NetAssign, both examiners and students must provide authentication details to the system. These authentication details are provided by NUICT to its students and examiners.

* * *