

ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව  
 இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம்  
 Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2012 අගෝස්තු  
 கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2012 ஓகஸ்ட்  
 General Certificate of Education (Adv. Level) Examination, August 2012

නව නිර්දේශය  
 புதிய பாடத்திட்டம்  
 New Syllabus

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

20 E II

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 மூன்று மணித்தியாலம்  
 Three hours

Index No. : .....

**Important :**

- \* 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 02 - 07)

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 08 - 11)

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 Awarded
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 the four questions on this paper itself.

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column

1. (a) Give **two** techniques used in operating systems to optimize processor utilization.

(b) The following shows a part of the result obtained by executing the “ping” command to check the network connectivity to a host connected to a computer network.

```
PING www.cam.ac.uk (131.111.8.46) 56(84) bytes of data.  
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46) : icmp_seq=1 ttl=242 time=201 ms  
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46) : icmp_seq=2 ttl=242 time=204 ms  
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46) : icmp_seq=3 ttl=242 time=196 ms  
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46) : icmp_seq=4 ttl=242 time=203 ms  
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46) : icmp_seq=5 ttl=242 time=195 ms  
--- www.cam.ac.uk ping statistics ---  
5 packets transmitted, 5 received,
```

Using the above information, answer the parts (i), (ii), (iii) and (iv) given below.

(i) What is meant by **time** in the above result?

(ii) What is the IP address of the server that hosts the website **www.cam.ac.uk**?

(iii) Identify the class of the IP address obtained in (ii) above.

(iv) What is the percentage of packet loss?

(c) In an operating system, a process can be in one of the states, namely, *created/new*, *waiting*, *running*, *terminated*, *blocked*, *swapped out and waiting*, or *swapped out and blocked*. From which of the above states can a process be directly moved into the *blocked* state?

2. (a) Provide a suitable definition for a system.

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(b) Using the definition suggested in (a) above, show that a mobile phone is a system.

(c) State whether a mobile phone is a close system or an open system. Justify your answer.

(d) State whether the following requirements of a mobile phone are functional or non functional. Justify your answers.

Do not write in this column

(i) A user shall be able to make a call using the mobile phone.

(ii) It shall not harm the user by emitting radiations.

3. (a) (i) Describe how you would determine whether a given positive integer is odd or even.

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(ii) Develop a flowchart to represent an algorithm, based on the method suggested in (i) above, to decide whether a given positive integer is odd or even.

(iii) Convert the flowchart you have obtained for the above (ii) into a pseudo code.

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column

(b) Show how the computation  $15+(-5)$  is done in 8-bit two's complement arithmetic.  
Explain how you deal with the carry generated in the most significant bit.

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column

4. (a) What do you mean by the terms “privacy” and “software piracy”?

(b) Describe the term “mobile computing”.

(c) Consider the following scenario :

A semi conductor manufacturing company has branches in Japan and USA. At present, representatives of the development team should visit other branches of the company frequently to discuss their technical issues. Over the years, the company has realized this mechanism is costly and time consuming.

(i) As an ICT student, suggest an *ICT based method* to conduct these technical review meetings without visiting the other branches.

(ii) Name **three** essential ICT devices required for the method suggested in (i) above.

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව  
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අධ්‍යයන සෞඳ්‍ය සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2012 අගෝස්තු  
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General Certificate of Education (Adv. Level) Examination, August 2012

නව නිර්දේශ  
புதிய பாடத்திட்டம்  
New Syllabus

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

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Part B



\* Answer any four questions only.

1. (a) (i) Describe the main difference between data and information by using a suitable system.  
(ii) Give **three** drawbacks of manual methods in manipulating data in bulk.  
(iii) Describe the terms hardware, software and firmware using examples.
- (b) A fan in a room can be on (1) or off (0). A control system is required to operate the fan efficiently with the following conditions/functionalities.
  1. The fan can manually be switched on or off.
  2. The timer will be either on or off.
  3. The sensor will detect whether the environment is cold or hot.
  4. The fan will automatically be switched on when the timer is on **and** the sensor indicates the environment is hot.

The following table assigns Boolean values for the above conditions/functionalities.

Condition / functionality	Boolean value
Fan switched on manually	1
Fan switched off manually	0
Timer is on	1
Timer is off	0
Sensor detects cold environment	1
Sensor detects hot environment	0

- (i) Draw a logic circuit by using a combination of only AND, OR and NOT gates to implement the above control system.
- (ii) Construct a truth table to represent the functionality of the above system.
- (iii) Write a Boolean expression (**not simplified**) to represent the truth table constructed in the (b)(ii) above.



3. (a) An application running in a computer refers the virtual memory address, 0100110100010111 during execution.
- Calculate the maximum accessible virtual memory address space, in the above computer in Kilo Bytes?
  - What is the range (starting and ending addresses) of the memory address space identified in the section (i) above?
  - If a page size is 4 Kbits, how many bits are sufficient to represent the page number? Show your computation.

(b) Assume that **A** and **B** are computers connected to **two** network segments. When the command 'ipconfig' is executed in these computers, the following information is obtained:

1. In computer **A**

IPv4 address .....: 192.168.1.2  
 Subnet mask .....: 255.255.255.0  
 Default gateway.....: 192.168.1.254

2. In computer **B**

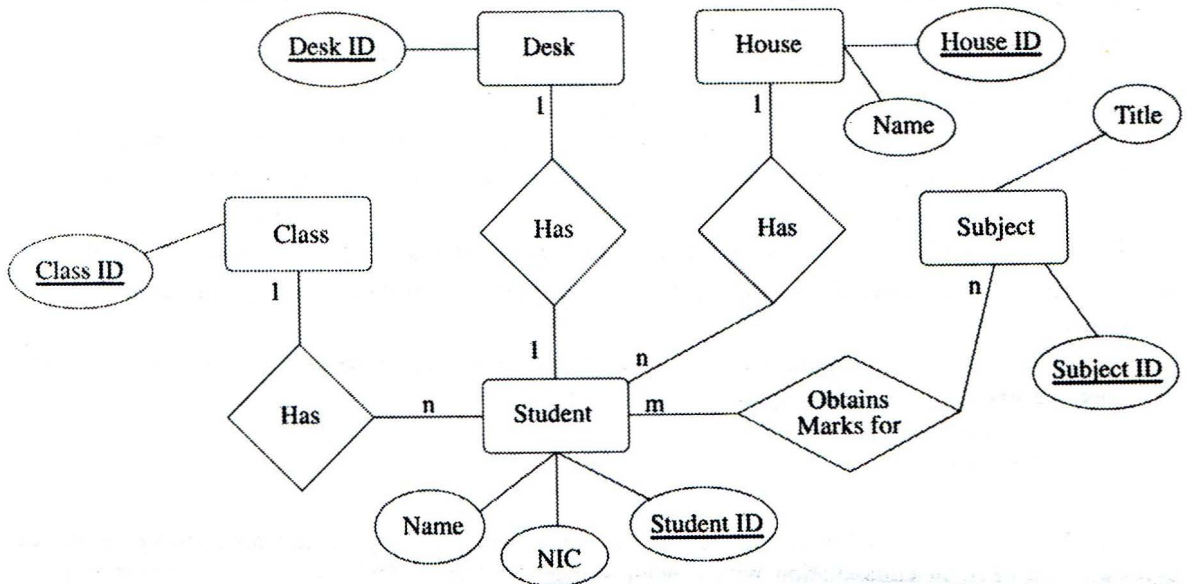
IPv4 address .....: 192.168.2.3  
 Subnet mask .....: 255.255.255.0  
 Default gateway.....: 192.168.2.254

Draw a network diagram for the above two network segments so that both **A** and **B** can communicate with each other. You should clearly indicate the IP addresses of each device in the diagram.

(c) Briefly explain the main function of each of the following systems in terms of network security.

- firewall
- proxy server
- honey pots

4. Consider the following ER diagram.

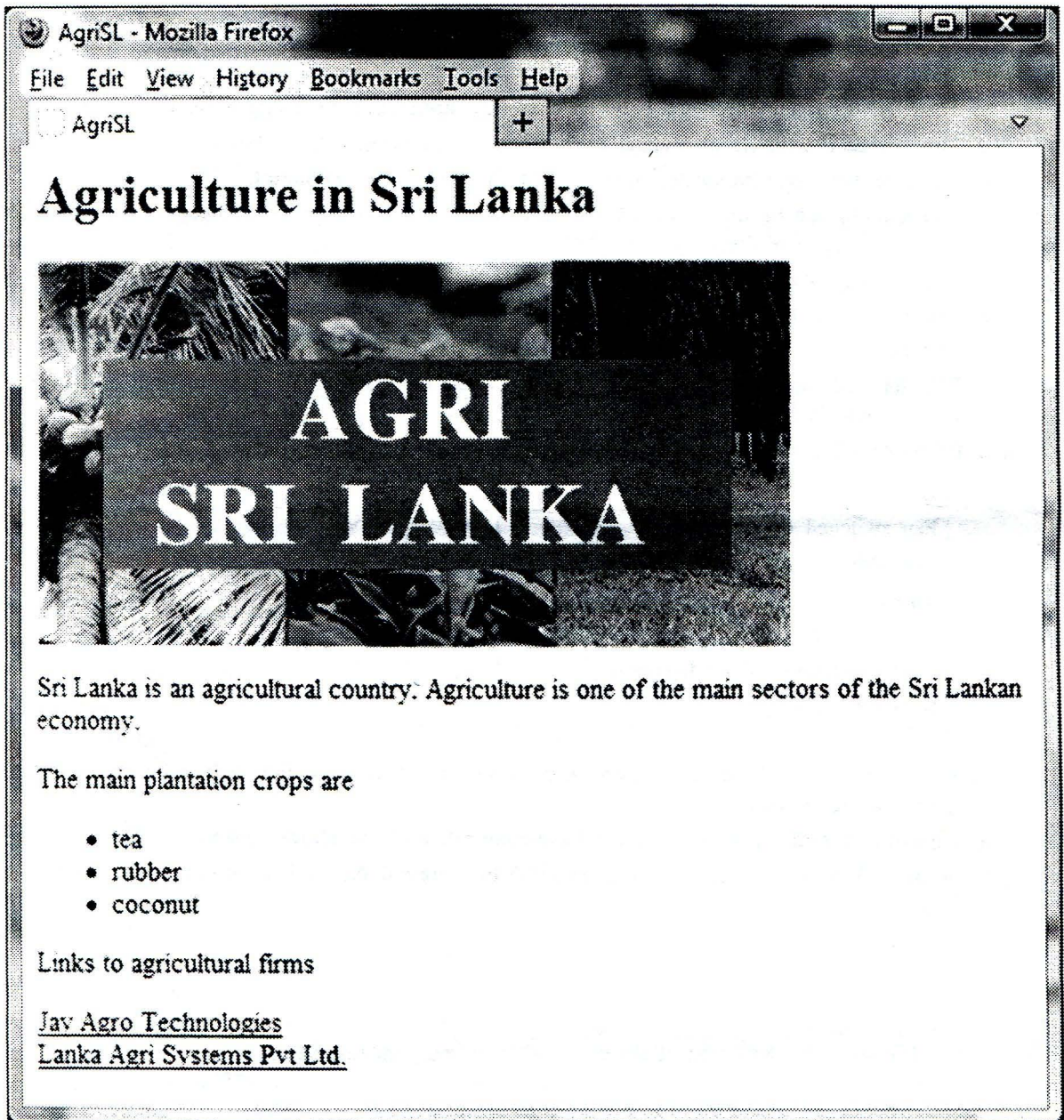


- State the **most relevant** entity or relationship in the above ER diagram to add an attribute to represent marks obtained by a student for a subject.
- Classify all the relationships in the above ER diagram as one-to-one, one-to-many or many-to-many. Justify your answer.
- Write the structure of the tables including their attributes when the above ER diagram is converted to a relational database.
- State the primary key for any table suggested in (c) above.
- Using the tables you have suggested in (c) above, write an SQL statement to get marks obtained for the subject with the value of Subject ID AL001 by the student with the value of Student ID ST001.

2. (a) What would be the responses by a browser for a paragraph tag and for a break tag in an HTML document?
- (b) What will be displayed when the following HTML code segment is rendered? Clearly indicate blank line(s) in the display, if any, with dotted lines (.....).

```
<p>Our evergreen school days<br/>
will not come back again</p>
<p>From the nursery to high school
we learnt the best</p>
```

- (c) A company named "Agri Sri Lanka" requires a web page as given below.



Write an HTML code to produce the above web page. Assume that the name of the image file is "agriSL.jpg". The links, **Jay Agro Technologies** and **Lanka Agri Systems Pvt Ltd.** should link to the sites "http://www.jayagrotec.com" and "http://www.lkagrisys.com" respectively.

5. Consider the following Python program named *example.py*

```
datasummary = {}
datakeys = []
def readdata():
    global datakeys, datasummary
    f1 = open('input.txt','r')
    line = f1.readline()
    while (line):
        data = line.strip().split(",")
        for dataitem in data:
            if dataitem in datasummary:
                datasummary[dataitem] += 1
            else:
                datasummary[dataitem] = 1
                datakeys = datakeys + [dataitem]
        line = f1.readline()
    f1.close()

def processdata():
    global datakeys
    for i in range(len(datakeys) - 1):
        for j in range(i+1, len(datakeys)):
            if(datakeys[i] > datakeys[j]):
                datakeys[i], datakeys[j] = datakeys[j], datakeys[i]

def printdata():
    global datakeys, datasummary
    f2 = open('output.txt','w')
    for key in datakeys:
        f2.write('{}-{}\n'.format(key,datasummary[key]))
    f2.close()

readdata()
processdata()
printdata()
```

- (a) What are the data types of the variables *datasummary* and *datakeys* in the above program?
- (b) Write a Python statement required to insert the program name as a comment at the beginning of the above program.
- (c) What is the result of execution of the command *open('input.txt','r')* in the above program?
- (d) Describe the main task of each of the functions *readdata()*, *printdata()* and *processdata()* in the above program.
- (e) If the content of the file *input.txt* is as given below, what would be the content of the file *output.txt* after the execution of this program?

a,d,b,a,n  
d,b,n,x,a

6. The Past Pupils Association (PPA) of a school has a large number of past students all over the country and overseas. The PPA, in collaboration with a leading local bookshop, decided to obtain support from the past students and other donors to increase the number of books in the library. The PPA agreed to develop a web-based system with on-line payment facilities for this activity. The title and the price of the required books for the library will be available on the website. The donors could select and pay for these required books available on the website. When a payment is made, this information will be sent to the bookshop for the delivery of the selected books to the school library.

- (a) Give **two** advantages of the suggested on-line method over traditional methods for book collection.
- (b) Give **one** disadvantage of ordering books through the suggested website.
- (c) Explain how you could improve the website to eliminate the disadvantage given in (b) above.