

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, 2013 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2013 ஓகஸ்த்
General Certificate of Education (Adv. Level) Examination, August 2013

නව නිර්දේශ
புதிய பாடத்திட்டம்
New Syllabus

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

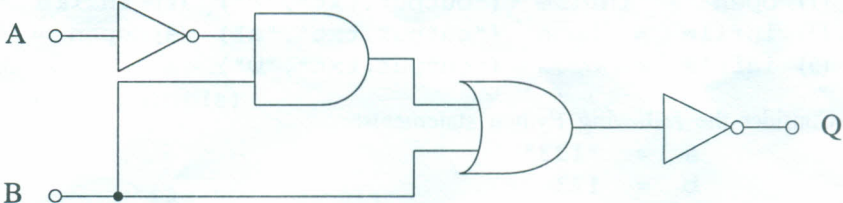
20 E I

පැය දෙකයි

இரண்டு மணித்தியாலம்
Two hours

Instructions:

- * Answer all the questions.
- * Write your **Index Number** in the space provided in the answer sheet.
- * Use of calculators is **not** allowed.
- * Instructions are given on the back of the answer sheet. Follow those carefully.
- * In each of the questions 1 to 50, pick one of the alternatives from (1), (2), (3), (4), (5) which is **correct** or **most appropriate** and mark your response with a cross (X) in accordance with the instructions given on the back of the answer sheet.

1. The Boolean expression $(x + y) \cdot (x + z)$ simplifies to
(1) x (2) $x \cdot (y + z)$ (3) $x \cdot y \cdot z$ (4) $x + y \cdot z$ (5) $x + y + z$
 2. Which of the following Boolean expressions represents the output (Q) of the circuit shown below?
A and B are inputs.
(1) $A' \cdot B' + A \cdot B'$
(2) $A' \cdot B' + A \cdot B$
(3) $A \cdot B + A' \cdot B'$
(4) $A' \cdot B + A \cdot B'$
(5) $A' \cdot B + A' \cdot B'$
- 
3. A high speed temporary storage, which is a part of the microprocessor that holds data and instructions during the execution, is called
(1) Registers. (2) RAM. (3) Virtual Memory.
(4) EPROM. (5) Flash Memory.
 4. Microprocessors are usually compared by their clock speed, measured in or by their word size, measured in that can be processed in a single clock cycle. Which of the following is most appropriate to fill the blanks in the above statement?
(1) Bits, Megahertz (2) Bytes, Gigahertz (3) Gigahertz, Bytes
(4) Megahertz, Bits (5) Seconds, Bits
 5. Typically the cache memory is used to store
(1) a large volume of data temporarily. (2) the least frequently accessed data permanently.
(3) the least frequently accessed data temporarily. (4) the most frequently accessed data temporarily.
(5) the most frequently accessed data permanently.
 6. Sharing a single microprocessor among number of application programs using context switching is known as
(1) Multi-user processing. (2) Multitasking. (3) Multiprocessing.
(4) Batch processing. (5) Online processing.
 7. Babbage's Difference Engine is based on
(1) mechanical technology. (2) vacuum tube technology.
(3) transistor technology. (4) Integrated Circuit (IC) technology.
(5) Very Large Scale Integrated (VLSI) Circuit technology.
 8. Which of the following components is located outside the microprocessor?
(1) Arithmetic Logic Unit (ALU) (2) RAM
(3) Control Unit (4) Registers
(5) Level 1 cache memory

9. Which of the following is an **incorrect** Karnaugh Map layout to represent a Boolean function of four (4) Boolean variables a, b, c and d?

(1)

ab\cd	01	00	10	11
01				
00				
10				
11				

(2)

ac\bd	01	00	10	11
01				
00				
10				
11				

(3)

ab\cd	01	00	11	10
01				
00				
11				
10				

(4)

ad\bc	11	10	00	01
11				
10				
00				
01				

(5)

ac\bd	00	10	11	01
00				
10				
11				
01				

10. What is the output of the following Python program?

```
s = "Nimal Perera"
print(s[1:3])
```

- (1) Ni (2) im (3) ra (4) er (5) Pe

11. Which of the following is a valid Python statement that can be used to open a file called "output.txt" so that new data can be added to the end of the file without deleting its original content?

- (1) open = infile ("output.txt", "r") (2) infile = open ("output.txt", "r")
 (3) infile = open ("output.txt", "a") (4) open = infile ("output.txt", "a")
 (5) infile = open ("output.txt", "w")

12. Consider the following Python statements:

```
a = "123"
b = 123
c = ['a', 2, (1, 2, 3)]
```

What are the data types of the variables a, b and c, respectively?

- (1) List, Integer, String (2) String, Integer, List (3) Integer, Integer, List
 (4) String, String, String (5) String, Float, Tuple

13. What will be the output when the following Python code is executed?

```
x = 6
while x > 0:
    x = x - 2
    print(x, end= ' ')
```

- (1) 6 (2) 4 2 (3) 2 4 6 (4) 4 2 0 (5) 0

14. Which of the following is an invalid Python identifier?

- (1) _name (2) Name (3) Name_ (4) 6Name (5) _6_names

15. Consider the following Python program:

```
a = [1, 2]
b = [3, 4]
c = a + b
print(c)
```

What is the output?

- (1) [4,6] (2) 10 (3) [1,2,3,4] (4) [[1,2],[3,4]] (5) [1,2]+[3,4]

16. What is the value after executing the Python expression 10-3*2+2.0?

- (1) 16 (2) 16.0 (3) 6 (4) 6.0 (5) 28

17. Which of the following is a syntactically correct Python program?

- (1)

```
def max(a, b)
    if(a > b)
        return a
    else
        return b
```
- (2)

```
def max(a, b):
    if(a > b):
        return a
    else:
        return b
```
- (3)

```
def max(a, b)
    if(a > b) then return a
    else return b
```
- (4)

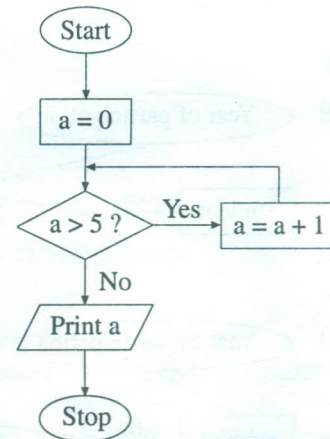
```
def max(a, b)
    if(a > b):
        return a
    else:
        return b
```
- (5)

```
function max(a, b):
    if(a > b):
        return a
    else:
        return b
```

● Use the following flowchart to answer the questions 18 and 19.

18. What is the output of the algorithm represented by this flowchart?

- (1) 0
- (2) 5
- (3) 4
- (4) 10
- (5) 15



19. Which of the following Python programs correctly represents this flowchart?

- (1)

```
a = 0
while (a > 5):
    a = a + 1
print(a)
```
- (2)

```
a = 0
while (a > 5):
    a = a + 1
print(a)
```
- (3)

```
a = 0
while not (a > 5):
    a = a + 1
print(a)
```
- (4)

```
a = 0
while not (a > 5):
    a = a + 1
print(a)
```
- (5)

```
a = 0
while (a <= 5):
    a = a + 1
print(a)
```

20. The binary number equivalent to the 25₁₀ is

- (1) 0100101.
- (2) 0100111.
- (3) 0011001.
- (4) 0010110.
- (5) 0010111.

21. 124₈ + 165₈ =

- (1) 201₈
- (2) 289₁₀
- (3) 289₈
- (4) 311₈
- (5) 389₈

22. Consider the following attributes related to business:

- A - Speed of services
- B - Purchase and distribution
- C - Security of goods sent
- D - Confidence in quality of items ordered

Which of the above is/are disadvantage(s) of e-business?

- (1) A only
- (2) C only
- (3) A and B only
- (4) C and D only
- (5) All A, B, C and D

23. Which of the following is the most appropriate Entity Relationship (ER) diagram to represent students' participation in different sports in school?

- (1)

```
graph LR; student[student] ---|1| participate{participate}; sport[sport] ---|m| participate; participate --- year((Year of participation))
```
- (2)

```
graph LR; student[student] ---|m| participate{participate}; sport[sport] ---|1| participate; participate --- year((Year of participation))
```
- (3)

```
graph LR; student[student] ---|m| participate{participate}; sport[sport] ---|n| participate; participate --- year((Year of participation))
```
- (4)

```
graph LR; student[student] ---|m| participate{participate}; sport[sport] ---|n| participate; participate --- year((Year of participation))
```
- (5)

```
graph LR; student[student] ---|m| participate{participate}; sport[sport] ---|n| participate; participate --- year((Year of participation))
```

24. Which of the following can be considered as an expert system?

- (1) A bank teller machine
- (2) A fully automatic washing machine
- (3) A microwave oven
- (4) A diagnosis system of a health care facility
- (5) An electronic blood pressure meter

25. Which of the following is a testing strategy which considers the internal implementation of a program into account?

- (1) Black box testing
- (2) White box testing
- (3) Integration testing
- (4) Acceptance testing
- (5) Unit testing

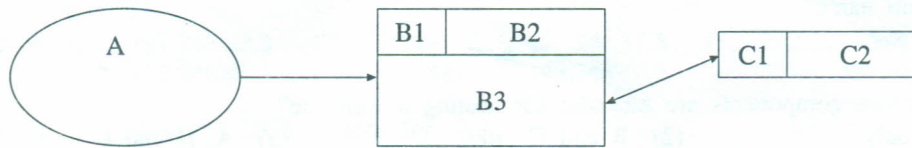
26. Which of the following information system development models has an extremely short and linear development process?

- (1) Waterfall model
- (2) Object-Oriented model
- (3) Spiral model
- (4) Incremental Development model
- (5) Rapid Application Development model

27. Which of the following is correct with respect to a relational database?

- (1) Any subset of Alternate Keys is called Candidate Key.
- (2) A Primary Key is selected from Alternate Keys.
- (3) A Foreign Key is an Alternate Key.
- (4) Always Primary Key and Foreign Key are combined to create a Compound Key.
- (5) Primary Key and Foreign Key establish the relationship between two tables.

28. Consider the following data flow diagram:



In the above data flow diagram A, B3 and C2 represent respectively. Which of the following terms is the most appropriate to fill the blank?

- (1) a process, an external entity and a data store
 - (2) an external entity, a process and a data store
 - (3) an external entity, a data store and a process
 - (4) a data store, a process and an external entity
 - (5) a data store, an external entity and a process
29. Consider the following systems in a human body:
- A - respiratory system
 - B - digestive system
 - C - nervous system
 - D - blood circulatory system
- Which of the above are closed systems?
- (1) A and B only
 - (2) A and C only
 - (3) B and C only
 - (4) B and D only
 - (5) C and D only
30. Which of the following statements best describes a non functional requirement of a system?
- (1) A user shall be able to measure the blood pressure using an electronic blood pressure meter.
 - (2) A microwave oven should not exceed its temperature above 400° C.
 - (3) An electronic calculator should be able to compute square root of a given positive integer.
 - (4) An Automatic Teller Machine of a bank shall be able to check the validity of an ATM card.
 - (5) An internet banking system shall provide balance inquiry facility to its customers.
31. Which of the following statements is true with regard to data and information?
- (1) Decision can be made only when a massive volume of data is available.
 - (2) Validity of information depends on the accuracy of data.
 - (3) Information obtained by processing data is always accurate.
 - (4) In order to obtain information, data must be collected from multiple sources.
 - (5) The accuracy of information depends only on the accuracy of input data.
32. Consider the following techniques :
- A - Computer Aided Learning (CAL)
 - B - Computer Based Learning (CBL)
 - C - Computer Based Assessment (CBA)
- Which of the above techniques is/are used in ICT based Teaching and Learning?
- (1) A only
 - (2) B only
 - (3) A and B only
 - (4) B and C only
 - (5) All A, B and C
33. The generation of monthly salary slips of employees in an organization is an example for
- (1) Batch processing.
 - (2) Real time processing.
 - (3) Online processing.
 - (4) Transaction processing.
 - (5) Interactive processing.
34. Consider the following statements about Firmware :
- A - Firmware is the program required to bootup a computer system.
 - B - Firmware is incorporated in washing machines.
 - C - Firmware can be easily changed later on.
- Which of the above statements is/are correct?
- (1) A only
 - (2) B only
 - (3) A and B only
 - (4) A and C only
 - (5) B and C only

35. Consider the following components:

- A - Web authoring tool
- B - Domain name
- C - Web pages
- D - Web server

Which of the above components are essential for hosting a web site?

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

36. Which of the following tag is used to render a heading on an HTML page?

- (1) <h2>
- (2)
- (3)
- (4) <hr>
- (5) <td>

37. Which of the following could be used to define a new markup language for sharing information?

- (1) CSS
- (2) XML
- (3) HTML
- (4) XHTML
- (5) JavaScript

38. Consider the following HTML code segment:

```
<dl>
<dt>Teacher</dt>
<dd>A person who teaches in a school.</dd>
<dt>Student</dt>
<dd>A person who is studying at a school</dd>
</dl>
```

Which of the following shows the correct rendering of the above HTML code segment?

- (1)

Teacher A person who teaches in a school. Student A person who is studying at a school	Teacher - A person who teaches in a school. Student - A person who is studying at a school
---	---
- (2)

Teacher : A person who teaches in a school. Student : A person who is studying at a school	Teacher : A person who teaches in a school. Student : A person who is studying at a school
---	---
- (3)

Teacher - A person who teaches in a school. Student - A person who is studying at a school	
---	--
- (4)

Teacher : A person who teaches in a school. Student : A person who is studying at a school	
---	--
- (5)

Teacher - A person who teaches in a school. Student - A person who is studying at a school	
---	--

39. Which of the following statements is correct with regard to HTML tags?

- (1) The
 is used to render a blank line before and after the text.
- (2) The <p> is used to render a blank line before and after the text.
- (3) The
 is used to render a blank line before the text.
- (4) The <p> is used to render a blank line only before the text.
- (5) The <p> is used to render a blank line only after the text.

40. Consider the following HTML code segments:

- A - <embed height="50" width="100" src="song.mp3"></embed>
- B - Song
- C - <embed height="50" width="100" href="song.mp3"></embed>

Which of the above code fragment(s) can be used to embed the audio file named 'song.mp3' in a web page?

- (1) A only
- (2) B only
- (3) C only
- (4) A and B only
- (5) B and C only

41. What is the main function of a PROXY server in Internet communication?

- (1) Allocate and release IP addresses
- (2) Translate domain names to IP addresses
- (3) Protect a network from viruses
- (4) Provide printing services to users
- (5) Share an Internet connection among several computers

42. An organization has been allocated a Class C IP address range having a subnet mask of 255.255.255.0. If the organization is to setup a web server and an email server, what are the IP addresses that can be allocated to these two servers?
(1) 192.248.87.2, 192.248.32.3 (2) 192.248.87.4, 192.248.87.5 (3) 192.248.32.3, 192.248.33.3
(4) 192.248.40.2, 192.248.41.3 (5) 192.248.87.1, 192.248.60.2
43. In communication networks, ISDN stands for
(1) Integrated Service Domain Name. (2) Internet Service Directory Name.
(3) Integrated Service Digital Network. (4) Internet Service Digital Network.
(5) Integrated Service Domain Network.
44. In the OSI reference model, detection of errors during communication between two computers in a network is a function of the
(1) physical layer. (2) data link layer. (3) network layer.
(4) transport layer. (5) application layer.
45. The command that can be used to login to a remote computer through a network is
(1) ipconfig. (2) ftp. (3) telnet. (4) tracert. (5) route.
46. Which of the following devices can be used to connect two physical networks having IP addresses 72.110.0.0 (subnet mask 255.255.0.0) and 192.248.10.0 (subnet mask 255.255.255.0)?
(1) Hub (2) Repeater (3) Switch (4) Router (5) Multiplexer
47. Consider the following statements regarding relational databases:
A - Changing the column order of relations in a database structure does not necessarily require changes in application programs.
B - Main objective of normalization of databases is to reduce data redundancy.
C - Adding new data to the database always requires changes to the existing programs.
Which of the above statements is/are correct?
(1) A only (2) B only (3) A and B only
(4) A and C only (5) All A, B and C
48. Ubiquitous Computing is a/an computing environment. The user will be able to use both and services.
Which of the following is most appropriate to fill the blanks in the above statement?
(1) everywhere, mobile, local (2) everywhere, local, remote (3) everywhere, local, paid
(4) virtual, local, remote (5) virtual, mobile, global
49. What is the two's complement of -6_{10} ?
(1) 11111010 (2) 00000110 (3) 11111001 (4) 01011111 (5) 00000101
50. Consider the following two relations:
student(stdNo, name)
courseMarks(courseId, stdNo, marks)
Which of the following SQL (Structured Query Language) statements on the above relations is syntactically correct?
(1) select stdNo, marks from student, courseMarks
(2) select * from student and courseMarks
(3) select s.stdNo and c.marks from student s, courseMarks c
(4) select student.stdNo, courseMarks.marks from student, courseMarks
where student.stdNo = courseMarks.stdNo
(5) select student.stdNo and courseMarks.marks from student and courseMarks
where student.stdNo = courseMarks.stdNo

* * *

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී 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 இலங்கைப் பரීட்சைத் திணைக்களம்
 Department of Examinations, Sri Lanka 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, 2013 අගෝස්තු
 கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2013 ஓகஸ்ட்
 General Certificate of Education (Adv. Level) Examination, August 2013

නව නිර්දේශ
 புதிய பாடத்திட்டம்
 New Syllabus

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

20 E II

පැය තුනයි
 மூன்று மணித்தியாலம்
 Three hours

2512

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 - 06)

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 07 - 09)

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.

Do not write in this column

1. Consider the section of a web page on the Sri Lankan Test Cricket team, given in the Figure:

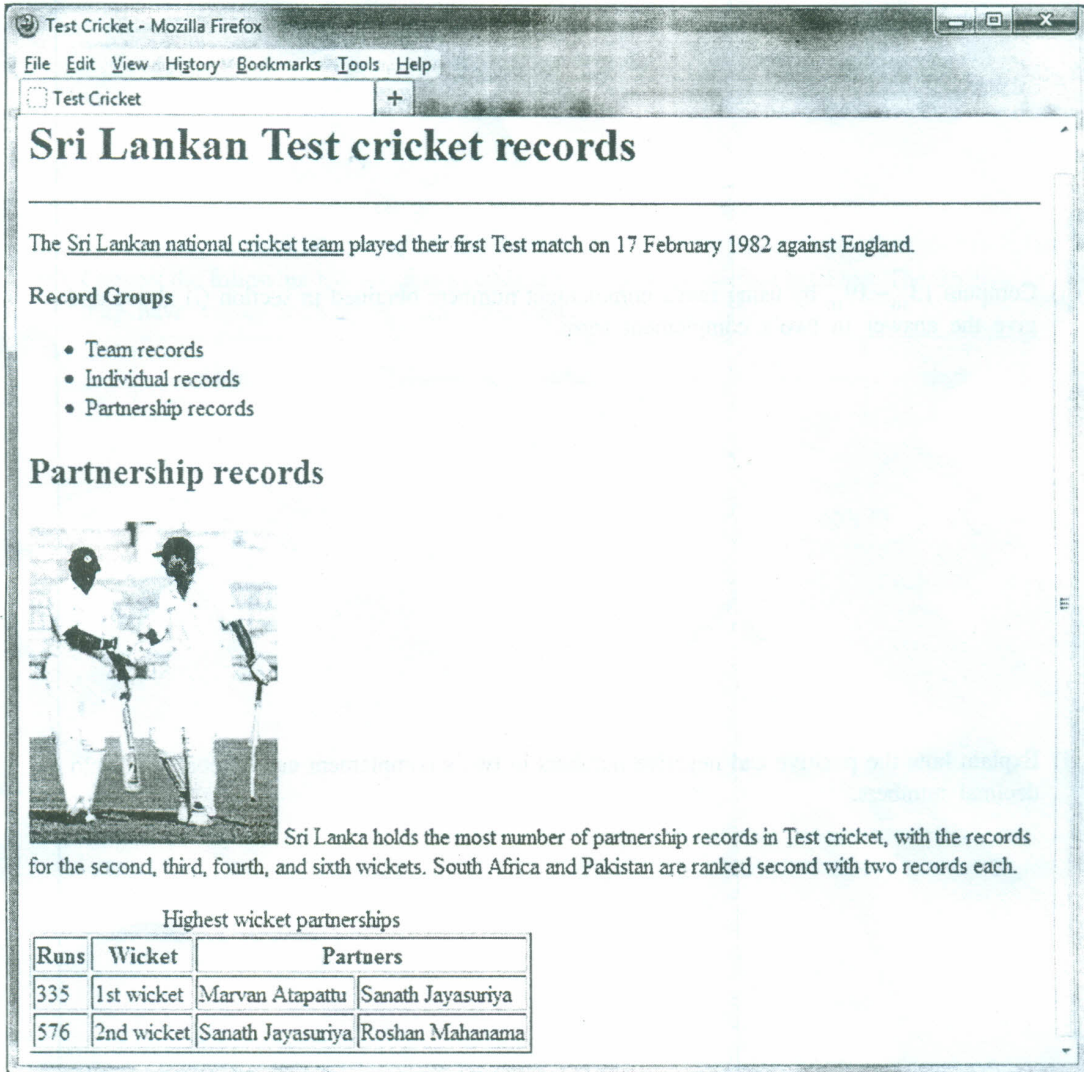


Figure : Web page

A partial HTML document of the file "cricket.html" which generates the above web page is given below. Fill in the blanks of the HTML document with the appropriate tags to render the web page.

Notes:

1. When the user clicks on the phrase "Sri Lankan national cricket team" it should display the document named "team.html".
2. Name of the source file of the image displayed on the above webpage is "cricket.jpg".
3. The link to the image "cricket.jpg" should have an alternative description "cricket".

Do not write in this column

```

<html>
<head>
<.....>Test Cricket<.....>
</head>
<body>
<.....>Sri Lankan Test cricket records<.....>
<.....>
<p>The<.....>
Sri Lankan national cricket team <.....>
played their first Test match on 17 February 1982 against England.
</p>
<p><.....>Record Groups<.....></p>
<.....>
<li>Team records</li>
<li>Individual records</li>
<li>Partnership records</li>
<.....>
<.....>Partnership records<.....>
<p><.....>Sri Lanka holds the most
number of partnership records in Test cricket,
with the records for the second, third, fourth, and sixth wickets.
South Africa and Pakistan are ranked second with two records each.
</p>
<.....>
<.....>Highest wicket partnerships<.....>
<tr>
<th>Runs</th>
<th>Wicket</th>
<th colspan = "2">Partners</th>
</tr>
<tr>
<td>335</td>
<td>1st wicket</td>
<td>Marvan Atapattu</td>
<td>Sanath Jayasuriya</td>
</tr>
<tr>
<td>576</td>
<td>2nd wicket</td>
<td>Sanath Jayasuriya</td>
<td>Roshan Mahanama</td>
</tr>
</table>
</body>
</html>

```



2512

2. (a) If a computer system is byte addressable and uses 32-bit addresses to access any byte in its memory, what is the maximum usable size of its memory in Giga Bytes (GB)? Show all your workings clearly.

Do not write in this column

(b) What is the relationship between a program and a process in an operating system?

(c) What is the need of having “swapped out and waiting” and “swapped out and blocked” states in the seven state process model of an operating system?



Do not write in this column

3. (a) (i) Convert 13_{10} and -19_{10} into two's complement numbers. Use 8-bits to represent a number.

(ii) Compute $13_{10} - 19_{10}$ by using two's complement numbers obtained in section (i) above and give the answer in two's complement form.

(iii) Explain how the positive and negative numbers in two's complement can be converted into decimal numbers.

(b) Give four (4) different examples for the following electronic business types:

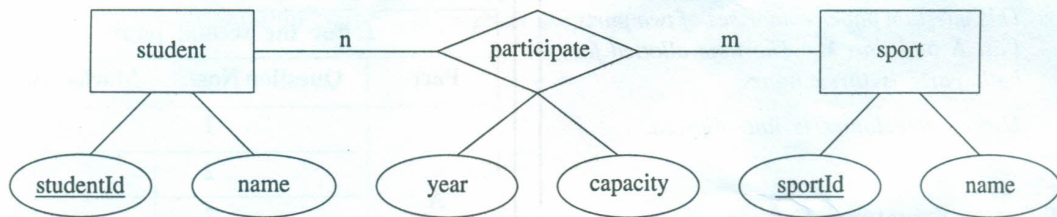
Type	Example
B2B	
B2C	
C2C	
C2B	



4. (a) Describe the relationship between a primary key and a foreign key in relational databases.

Do not write in this column

(b) Convert the following ER diagram to table structures in a relational database. The attribute capacity may have values such as captain, vice captain, member etc.



(c) Based on the table structures obtained in section 4(b) above answer the following questions.

(i) Write an SQL statement to get a list of sports that do not have captains.

(ii) Write an SQL statement to obtain a list of students (studentId and name) who participate in any sport as a captain.

* *



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
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் 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 Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2013 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2013 ஓகஸ்ட்
General Certificate of Education (Adv. Level) Examination, August 2013

නව නිර්දේශය
புதிய பாடத்திட்டம்
New Syllabus

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

20 E II

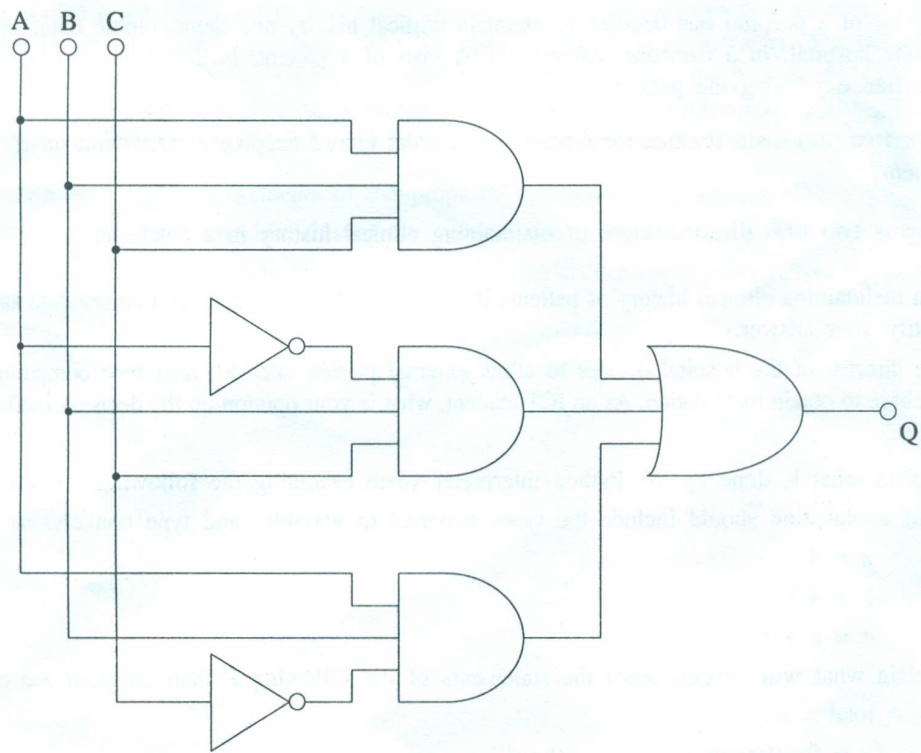
Part B

* Answer any four questions only.

1. (a) A fire alarm system consists of three sensors S1, S2 and S3 to detect smoke, flame and heat respectively. A sensor can either be active (sends the logical value 1) or inactive (sends the logical value 0). The system automatically triggers the fire alarm when at least two of the sensors are active.

- (i) Construct the truth table to represent the functionality of the above fire alarm system.
- (ii) Derive the Boolean expression to represent the above truth table.

(b) Consider the logic circuit shown here to answer the sections (i) and (ii) below:



- (i) Write and simplify the Boolean expression for the above circuit using Boolean algebra. Show all the workings and algebraic rules used for the simplification.
- (ii) Construct the logic circuit using a combination of only AND, OR and NOT gates for the simplified Boolean expression obtained in section b(i) above.

2. (a) Compare and contrast the following communication technologies:
- (i) ISDN vs ADSL
 - (ii) CDMA vs GSM
- (b) Give the main function of the following servers:
- (i) Web server
 - (ii) Mail server
 - (iii) Proxy server
 - (iv) DHCP server
- (c) An organization has installed a web server, a mail server, a proxy server and a DHCP server to provide Internet based services to its employees. There are ten (10) computers in the organization connected to a local area network. IP addresses are dynamically allocated to these ten computers.
- Assume that adequate network cables and two network switches are provided to connect computers to the network. Each switch is capable of connecting a maximum of sixteen (16) computers to the network.
- (i) Draw a network diagram to show how these ten computers are connected to the local area network.
 - (ii) Draw a **separate** network diagram to show how the web server and e-mail server are connected to the Internet.
 - (iii) Draw **another** network diagram to show how the two networks designed in c(i) and c(ii) above can be connected using a proxy server in order to provide Internet connectivity to computers connected to the local network.
3. The director of a hospital has decided to maintain clinical history and demographic data, of all the patients visiting the hospital, in a database. After the first visit of a patient, his/her clinical history is available to the physician examining the patient.
- (a) Give **two (02)** main reasons for replacing a manual record keeping system with an electronic database system?
 - (b) Discuss **two (02) disadvantages** of maintaining clinical history in a database.
 - (c) Can maintaining clinical history of patients in a database be considered as a component of e-Government? Justify your answer.
 - (d) The director of the hospital decides to allow external parties, such as, insurance companies to access this database to obtain information. As an ICT student, what is your opinion on the decision made by the director?
4. (a) Explain what is done by the Python interpreter when executing the following program.
Your explanation should include the types assigned to variables and type conversions.
- ```
a = 4
b = 4.7
c = a + b
```
- (b) Explain what will happen when the statements of the following Python program are executed.
- ```
total = 0.0
x = float(input("Enter a number:"))
while x > 0 :
    total = total + x
    x = float(input("Enter a number:"))
print(total)
```
- (c) You are requested to write a Python program to find and display the maximum value of given 10 integers. The program should read integers one at a time.
- (i) Propose an algorithm to solve the problem using a flow chart.
 - (ii) Write a Python program to implement your flow chart proposed in section c (i).

5. Draw an Entity Relationship (ER) diagram to represent the scenario given below. The attributes and the primary keys of entities should be clearly indicated. State if any assumptions that you make clearly.

ABC cab Service Company **does not** own any car. Private car owners can register with the company and also rent their cars. Some car owners provide more than one car to the company. The company hires drivers for these cars. Any car available for rent can be driven by different drivers on different days. Car owners are responsible for maintenance of their cars in order to provide a reliable service to the customers. After completing each hire, the driver informs his current location to the company. When a customer requests a car, the company looks for the availability of a car in the vicinity of the calling area. If a car is available, company assigns that to the customer and informs both customer and the driver. The company tries its best to assign the nearest available car to the customer to make its services more efficient. The company keeps customer information such as name, address and the contact telephone number to provide a better service to their regular customers. The customers can also inform to the company whether they are happy with the services provided by the driver. This information is used when assigning drivers to the customers. Each car owner, car, driver and the customer are given "ownerId", "carId", "driverId", and the "custId" respectively to identify them uniquely.

6. A delivery service company established in Sri Lanka receives over 1 million parcels per day for distribution. In order to send them to different parts of Sri Lanka, these parcels should be sorted and put into appropriate delivery vans. At present, 5 people at the sorting department do this process manually. This process has a drawback of putting parcels into wrong delivery van. Taking at least 3 days to distribute parcels received within a day is also a weakness in this process. Therefore, the general manager has decided to automate the sorting process by using a bar code system. The bar code pasted on parcel consists of the receiver's postal code. The proposed computer based system will read these bar codes, sort the parcels automatically and put them into the correct delivery van through a conveyor belt without human intervention. The general manager strongly believes that computerization will help them to overcome the current problems in the sorting process.
- (a) Identify **two** functional requirements of the proposed computer based system. Justify your answer.
 - (b) State **two** non functional requirements of the system with justifications.
 - (c) Discuss, giving **two** reasons, whether the general manager's decision to computerize the sorting process is correct or not.

* * *

G.C.E.(A/L) Examination - 2013

**NATIONAL EVALUATION & TESTING SERVICE
DEPARTMENT OF EXAMINATION - SRI LANKA**

20 - Information & Communication Technology

Marking Scheme

ரஹஸ்யம்

அந்தரங்கமானது

தீர்மான வினா தேர்வுகளை

இலங்கைப் பரீட்சைத் திணைக்களம்

புதிதான அறிவு மற்றும் பரீட்சைத் திணைக்களம்

தேசிய மதிப்பீட்டிற்கும் பரீட்சைத் திணைக்களம் சேவை

அ.பா.க. (உ.பா.க.) வினா 2013

க.பா.க. (உ.பா.க.)ப் பரீட்சை 2013

வினா

பாடம்

ICT

வினா அளவு

பாட இலக்கம்

20

தேர்வு திணைக்களம் - I பகுதி
புதிதான அறிவு மற்றும் திட்டம் - பத்திரம் I

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

வினா அளவு

வினா அறிவுறுத்தல்

புதிதான அறிவு

ஒரு சரியான விடைக்கு

01

வினா

புதிதான அறிவு

GCE AL Examination, August 2013 (AL/2013/20/E-II) – MCQ

(Model Answers)

Q No.	Answer	Q No.	Answer	Q No.	Answer	Q No.	Answer	Q No.	Answer
1.	4	11.	3	21.	4	31.	2	41.	5
2.	1	12.	2	22.	4	32.	5	42.	2
3.	1	13.	4	23.	3	33.	1	43.	3
4.	4	14.	4	24.	4	34.	3	44.	2
5.	4	15.	3	25.	2	35.	5	45.	3
6.	2	16.	4	26.	5	36.	1	46.	4
7.	1	17.	2	27.	5	37.	2	47.	3
8.	2	18.	1	28.	2	38.	1	48.	2
9.	3	19.	2	29.	5	39.	2	49.	1
10.	2	20.	3	30.	2	40.	4	50.	4

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
1		<pre> <head> <title>Test Cricket</title> </head> <body> <h1>Sri Lankan Test cricket records</h1> (or h2) <hr/> <p>The Sri Lankan national cricket team played their first Test match on 17 February 1982 against England. </p> <p>Record Groups</p> (or h3/h4) (Strong) Team records Individual records Partnership records <h2>Partnership records</h2> (or h3) <p> Sri Lanka holds the most number of partnership records in Test cricket, with the records for the second, third, fourth, and sixth wickets. South Africa and Pakistan are ranked second with two records each. </p> <table border = "1"> or "2" <caption>Highest wicket partnerships</caption> <tr> <th>Runs</th> <th>Wicket</th> <th colspan = "2">Partners</th> </tr> <tr> <td>335</td> <td>1st wicket</td> <td>Marvan Atapattu</td> <td>Sanath Jayasuriya</td> </tr> </pre>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	10

(Model Answers)

		<pre> <tr> <td>576</td> <td>2nd wicket</td> <td>Sanath Jayasuriya</td> <td>Roshan Mahanama</td> </tr> </table> </body> </html> </pre> <p>Notes: <hr/> or <hr> is considered as correct answer. or is considered as correct answer.</p>		
2	(a)	<p>Address space = 2^{32} Maximum usable size of memory = 2^{32} bytes = $2^2 \times 2^{30}$ bytes = 4GB</p> <p><i>data and all.</i> <i>optional</i></p>	<p>$2^{32}/2^{30} = 2^2 = 4GB$</p> <p>1 1 1</p>	3
	(b)	<p>Process is a program in execution - <i>program</i> Program can have multiple processes</p>	<p>1 1</p>	2
	(c)	<p>To suspend a process temporary to the hard disk <i>or virtual memory</i> in order to free the memory (memory full), to place another process in the main memory.</p> <p>Note: 1. suspend a process 2. temporary 3. hard disk 4. free the memory (memory full) 5. to place another process in the main memory.</p>	<p>1 1 1 1 1</p>	5

memory full no swapped out

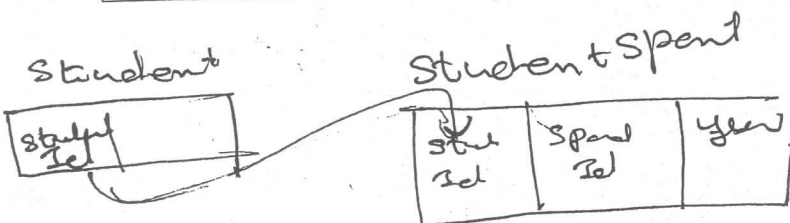
(Model Answers)

Q No	Section	Model Answer	Marks				
			Break down	Total			
3	(a) i	$13_{10} - 00001101$ $-19_{10} - 11101101$	1 2	3			
	(a) ii	$13_{10} - 19_{10} =$ <table style="margin-left: 100px;"> <tr><td>00001101</td></tr> <tr><td><u>11101101</u></td></tr> <tr><td>11111010</td></tr> </table>	00001101	<u>11101101</u>	11111010	1	1
00001101							
<u>11101101</u>							
11111010							
	(a) iii	<p style="text-align: center;"><i>negative or positive</i></p> <p>Identify the sign of the final decimal number by most significant bit (both positive and negative)</p> <p>Most significant digit is 0 → positive convert to decimal</p> <p>Most significant digit is 1 → negative Take the sign as negative Get binary number Invert bit values Add 1 to least significant bit Convert the number to decimal</p> <p>Or</p> <p>Apply the reverse process of two's complement (explanation) Convert the number to decimal</p> <p style="text-align: right;"><i>explain with the example.</i></p>	1 1	2			
	(b)	<p>Examples having following features</p> <p>B2B: Purchase & sale between 2 companies through Internet Mutual agreement Consumers are not involved</p> <p>B2C: Products and services sold through Internet Business to consumers <i>www.</i> Consumer to consumed (<u>Amazon.com</u>)</p> <p>C2C: Sale of goods across Internet Consumer to consumer</p> <p>C2B: Consumer acts as the seller and business as the buyer through Internet Consumer is made payment for the service provided.</p>	1 each	4			

site on 2nd explain. mod.

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
4	(a)	<p>Primary key of a table and foreign key of another table establish the relationship in a database.</p> <p>Note:</p> <p>1. When only the foreign key definition is given: 1 mark only 2. Given the relationship: 2 marks</p> <p>Notes for teachers:</p> <p><u>Primary Key</u>: Identify each record in a database table uniquely. (This removes data duplication.) <u>Foreign key</u>: Foreign key of a table is a primary key of another table.</p>	2	2
	(b)	<p>1. student(studentId, name) 2. sport(sportId, name) 3. studentSport(studentId, sportId, year, capacity) <i>(studentId, sportId, year, capacity)</i></p> <p>Note:</p> <p>1. Three tables to represent student, sport and participate: 1 mark 2. Relating participate relation with other two tables: 1 mark 3. Proper attributes in each table: <i>primary key identify</i> 1 mark</p>		3
	(c) i	<p>Select <u>distinct</u> sportId from studentSport where capacity <> "captain" <i>captain</i></p> <p>Note: Reduce 1 mark if <u>distinct</u> is not specified.</p>	3	3
	(c) ii	<p>Select student.studentId, student.name from student, studentSport Where student.studentId = studentSport.studentId and studentSport.capacity = "captain"</p>	2	2



use of there is no arrows underline

(Model Answers)

Q No	Section	Model Answer	Marks																																					
			Break down	Total																																				
1	(a) i	<p>Smoke detector: S1 Flame detector: S2 Heat detector: S3 Output: Q</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><th>S1</th><th>S2</th><th>S3</th><th>Q</th></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table> <p style="margin-left: 200px;">$S1 = A = ?$ etc.</p> <p>Note: 8 correct rows: 4 marks 7 or 6 correct rows: 3 marks 5 or 4 correct rows: 2 marks 3 or 2 correct rows: 1 mark</p>	S1	S2	S3	Q	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	1	1	0	0	0	1	0	1	1	1	1	0	1	1	1	1	1	4	4
S1	S2	S3	Q																																					
0	0	0	0																																					
0	0	1	0																																					
0	1	0	0																																					
0	1	1	1																																					
1	0	0	0																																					
1	0	1	1																																					
1	1	0	1																																					
1	1	1	1																																					
	(a) ii	$Q = S1'.S2.S3 + S1.S2'.S3 + S1.S2.S3' + S1.S2.S3$	1	1																																				
	(b) i	<p> $Q = A.B.C. + A'.B.C + A.B.C'$ =working = B.[A + C] </p> <p style="margin-left: 100px;"> $B.A.(A+A') + A.B.C'$ $B.C + A.B.C'$ $B(C+A)$ </p> <p style="margin-left: 100px;"> (at least two) algebraic rules </p> <p>Note: If the simplification is stopped one step above or gone one more step further, only 3 marks out of 4</p>	1 4 2	7																																				

Select distinct name

from student spent A, spent B

where capacity \leftrightarrow 'captain'

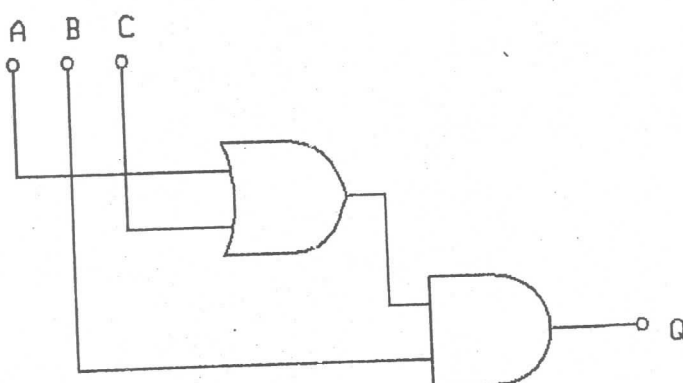
not capacity \neq capt

and student - sport student id

= $\frac{\text{spent} \cdot \text{spent id}}{B}$

order by name (optional)

(Model Answers)

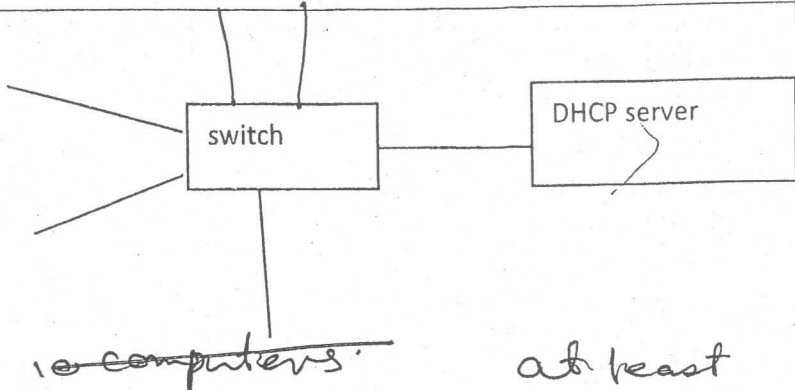
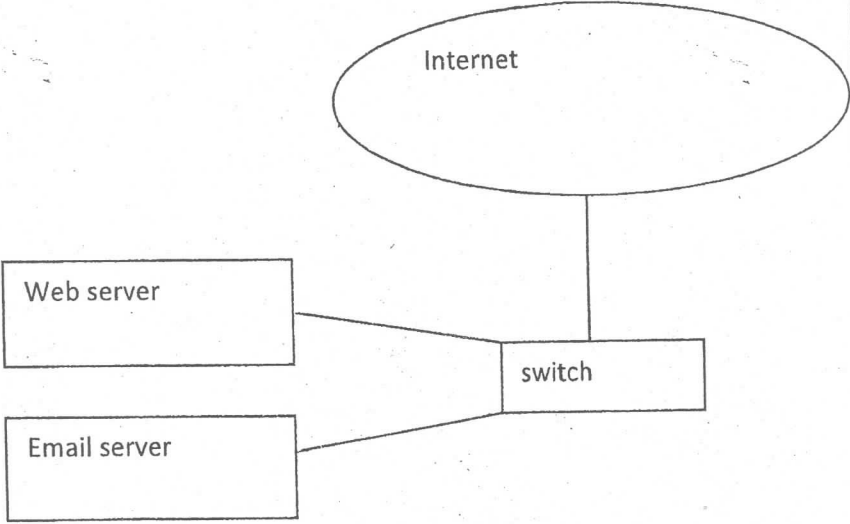
Q No	Section	Model Answer	Marks																			
			Break down	Total																		
1.	(b) ii	 <p>Note:</p> <ol style="list-style-type: none"> The 3 marks should be given only when the simplification has given at least 3 marks out of 4. The diagram is drawn to the final simplification expression. 	3 Or 0	3																		
2	(a) i	<table border="0"> <tr> <td>Speed:</td> <td>ISDN Upload and download are same</td> <td>ADSL faster download speeds than upload speeds.</td> </tr> <tr> <td>Connectivity:</td> <td>end-to-end</td> <td>point-to-point</td> </tr> <tr> <td></td> <td>Multiple access</td> <td>Single access</td> </tr> <tr> <td></td> <td>Synchronous</td> <td>Asynchronous</td> </tr> <tr> <td></td> <td>Low speed data</td> <td>High speed data</td> </tr> <tr> <td>Signal type:</td> <td>Both provide digital communication (data and voice)</td> <td></td> </tr> </table> <p>Notes for teachers:</p> <p>ISDN - Integrated Services Digital Network: provides end-to-end (circuit switched) connectivity through a 64 kbps digital circuit.</p> <p>ADSL – Asymmetric digital subscriber line: provides faster data transmission over copper telephone lines. The technology provides faster download speeds than upload speeds.</p>	Speed:	ISDN Upload and download are same	ADSL faster download speeds than upload speeds.	Connectivity:	end-to-end	point-to-point		Multiple access	Single access		Synchronous	Asynchronous		Low speed data	High speed data	Signal type:	Both provide digital communication (data and voice)		1	2
Speed:	ISDN Upload and download are same	ADSL faster download speeds than upload speeds.																				
Connectivity:	end-to-end	point-to-point																				
	Multiple access	Single access																				
	Synchronous	Asynchronous																				
	Low speed data	High speed data																				
Signal type:	Both provide digital communication (data and voice)																					

~~1~~
~~X~~
not equal

(Model Answers)

Q No	Section	Model Answer	Marks																																									
			Break down	Total																																								
2	(a) ii	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">Channels:</td> <td style="width: 30%;">CDMA Single</td> <td style="width: 30%;">GSM Multiple</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>Data transmission rate</td> <td>Fast</td> <td>Slow</td> <td></td> <td></td> </tr> <tr> <td>Security of data</td> <td>More</td> <td>Less</td> <td></td> <td></td> </tr> <tr> <td>Encoding</td> <td>Digital</td> <td>Digital</td> <td></td> <td></td> </tr> <tr> <td>Signal</td> <td>Radio/Wireless</td> <td>Radio/wireless</td> <td></td> <td></td> </tr> <tr> <td></td> <td>3G</td> <td>3G</td> <td></td> <td></td> </tr> <tr> <td></td> <td colspan="2">Voice and data both</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Medium of transmission</td> <td>Both wireless</td> <td></td> <td></td> </tr> </table> <p>Notes for teachers: CDMA - Code division multiple access: allows several transmitters to send information simultaneously over a single communication channel. Each transmitter is assigned a code to allow multiple users to be multiplexed over the same physical channel. GSM - Global System for Mobile Communications: is an open, digital cellular technology used for transmitting mobile voice and data services. In this technology, mobile phones make the connections by searching for cells in the immediate vicinity.</p>	Channels:	CDMA Single	GSM Multiple			Data transmission rate	Fast	Slow			Security of data	More	Less			Encoding	Digital	Digital			Signal	Radio/Wireless	Radio/wireless				3G	3G				Voice and data both					Medium of transmission	Both wireless			1	2
Channels:	CDMA Single	GSM Multiple																																										
Data transmission rate	Fast	Slow																																										
Security of data	More	Less																																										
Encoding	Digital	Digital																																										
Signal	Radio/Wireless	Radio/wireless																																										
	3G	3G																																										
	Voice and data both																																											
	Medium of transmission	Both wireless																																										
	(b) i	Web server – <u>serves web pages</u> stored in the server to client computers	1	1																																								
	(b) ii	Mail server – provides email facilities to client computers <i>handle emails</i>	1	1																																								
	(b) iii	Proxy server – allows a local network to access the Internet through a single public IP address (<u>sharing a single Internet connection</u>) <i>sharing important</i>	1	1																																								
	(b) iv	DHCP server – <u>assigns IP addresses dynamically</u> to computers connected to the network	1	1																																								

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
2	(c) i	 <p>switch</p> <p>DHCP server</p> <p>10 computers at least 1 mark</p> <p>Note: Without DHCP 1 mark 10 computers with switch</p>	2	2
	(c) ii	 <p>Internet</p> <p>Web server</p> <p>Email server</p> <p>switch</p> <p>Note: Without internet 1 mark</p>	2	2

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
2	(c) iii	<p>The diagram illustrates a network architecture. At the top is an oval labeled 'Internet'. A vertical line connects it to a horizontal box labeled 'switch'. To the left of this switch are two vertical boxes: 'Web server' and 'Email server', both connected to the switch by lines. Below this switch is another horizontal box labeled 'proxy server', connected by a vertical line. Below the proxy server is another horizontal box labeled 'switch', connected by a vertical line. To the left of this second switch are three lines representing network connections. To the right of this second switch is a horizontal box labeled 'DHCP server', connected by a horizontal line.</p>	3	3
		<p>Note:</p> <ol style="list-style-type: none"> Without proxy: (network 2/1) no marks. Proxy without two network connections: 2 marks only Proxy server without two switches: 1 mark only (two network connections) <p>proxy 2/20 switch 2/1 ①</p>		

System → environment
 Security → System
 Safety → System
 Environment → System

environment → system

GCE AL Examination, August 2013 (AL/2013/20/E-II) – PART B

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
3	(a)	1. Accuracy (data duplication) explanation 2. Efficiency explanation	1 1 1 1	4
	(b) <i>history</i>	1. Privacy of patients Justification 2. Safety of patients Justification	1 1 1 1	4
	(c) <i>not history as said</i>	No. Discussion of 1. Saving of money – <i>since cost is high</i> 2. Increase of efficiency 3. Increase of transparencies in state sector	1 1 1 1	4
	(d) <i>direct answer</i>	Not a good decision Reasons (b)	1 2 1 <i>if each</i>	3
4	(a)	a = 4 Acquires storage to store an integer value, assigns the label "a" and store (assign) the vale 4 at that location. b = 4.7 Acquires storage to store a floating point value, assigns the label "b" and store (assign) the vale 4.7 at that location. c = a + b Retrieves the value stored at the location (with the label) a, converts it to type float, retrieves the value stored at the location (with the label) b, add them together, Acquires storage to store a floating point value , assigns the label c, and stores (assigns) the result of the addition at that location.	1 1 2	4

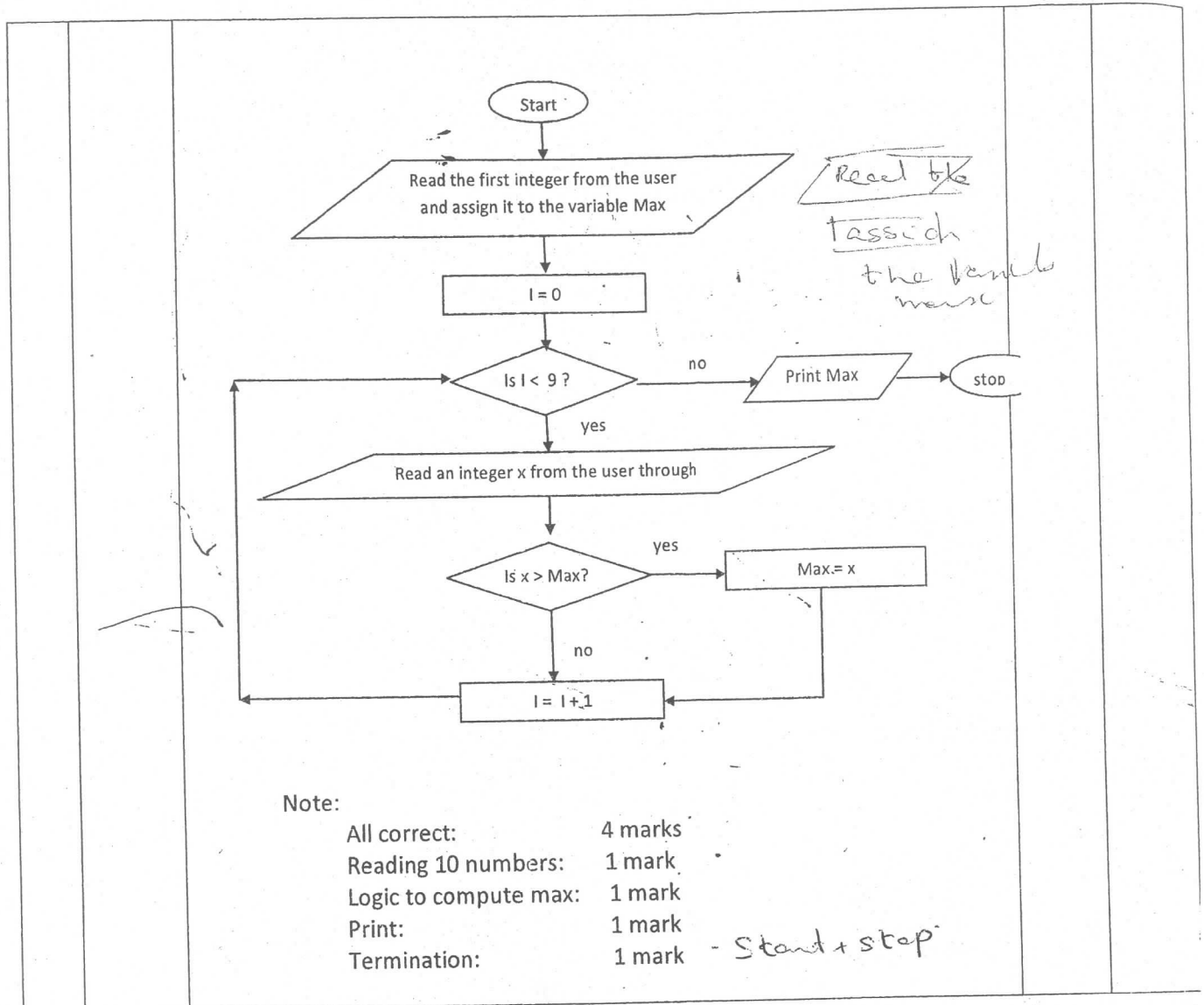
Retrieve the value stored for a and b

meaning dot of process

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
4	(b)	<p><i>w h e</i></p> <p><u>Reads a set of values</u> from the user through the keyboard/Console, <u>one at a time</u>, <u>till 0 or a negative value is entered</u>, <u>sum the values read except the last value</u>, and <u>print the result</u>.</p> <p>Notes: (1 Marks for all 4 essential components) <i>1 for bold and underline</i> (1 additional Mark for each other component) <i>each</i> <i>bold underline needs no marks</i></p>	4	4
4	(c) i	<p>Or</p> <pre> graph TD Start([Start]) --> Init[Max = very small value] Init --> I0[I = 0] I0 --> Loop{Is I < 10?} Loop -- no --> Print[/Print Max/] Print --> Stop([stop]) Loop -- yes --> Read[/Read an integer x from the user through/] Read --> Check{Is x > Max?} Check -- yes --> Update[Max = x] Check -- no --> Inc[I = I + 1] Update --> Inc Inc --> Loop </pre>		4

(Model Answers)



if: max = 0 — logic X

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
4	(c) ii	<p>Essential parts are in bold typeface</p> <pre> max = - 1000 # max should be assigned a value smaller than any value expected . for i in range(0,10): # range(x,y) should generate any list of 10 items x = int(input(str(i+1) + " Enter a value : ")) if x > max: max = x print("Maximum value is : ",max) or max = -1000 i = 0 while i < 10: x = int(input()) if x > max: max = x i = i + 1 print (max) or maximum = int(input("Input a number: ")) for i in range(0, 9): maximum = max(input("Input a number: ", maximum) print("Maximum value is: ", maximum) Note: All correct: 3 marks Reading 10 numbers: 1 mark Logic to compute max: 1 mark Print: 1 mark </pre>		3

Case sensitive -

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
5		<pre> erDiagram Company --o{ Car Owner : Register Company --o{ Driver : Hire Car Owner --o{ Car : Rent Car --o{ Customer : Request Car --o{ Driver : Drives Car Owner --o{ Car Owner : OwnerID Car --o{ Car : carID Driver --o{ Driver : driverID Customer --o{ Customer : name Customer --o{ Customer : address Customer --o{ Customer : custID Customer --o{ Customer : contactTP </pre>		

Handwritten scribble

(Model Answers)

Q No	Section	Model Answer	Marks	
			Break down	Total
		<p><u>Entities</u></p> <ol style="list-style-type: none"> 1. Car owner 2. Car 3. Driver 4. Customer 5. Company <p><u>Relationship with degrees</u></p> <p>Rent Request Drives</p> <p>Note: No marks for the other relationships with Company entity.</p> <p>Primary keys</p> <p>Attributes of customer</p> <p><i>Cardinalities by - optional</i></p>	<p>1 each</p> <p>1 each</p> <p>1 each</p> <p>1 each</p>	<p>5</p> <p>3</p> <p>4</p> <p>3</p>
6	(a)	<p>1. System <u>shall</u> (should) be able to sort items</p> <p>2. System <u>shall</u> (should) be able to put items into the correct delivery van</p> <p>3. System <u>shall</u> (should) be able to read bar code</p> <p>Note: 1 mark for the function and 1 mark for the justification</p>	<p>2 each</p>	4
	(b)	<p>1. Accuracy</p> <p>2. Efficiency</p> <p>Justification <i>reasons</i></p> <p>Note: Without justification 1 marks each.</p>	<p>2</p> <p>2</p> <p>2 each</p>	8
	(c)	<p>Correct</p> <p>Reasons (answer (b))</p>	<p>1</p> <p>1 each</p>	3