

අධ්‍යයන පොදු යහතික රාජ (සුයේ පෙල) විශාලය, 2013 අගෝස්තු කළේවිප් පොතුත් තුරාතරප් පත්තිරූපයර් තරප් පරීක්ෂා, 2013 ඉකෑල්‍ය General Certificate of Education (Adv. Level) Examination, August 2013

கல திரட்டை
புதிய பாடத்திட்டம்
New Syllabus

නොරතුරු හා සන්නිවේදන තාක්ෂණය තැකවල්, ජෛවල් වීඩොල් ප්‍රාග්ධන විද්‍යාව Information & Communication Technology

III

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III

ତ୍ରୈ ତୁଳା
ମୁନ୍଱ରୁ ମଣିତତ୍ତ୍ଵାଲମ୍
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 - 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 exten-
sive 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

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	

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Part A - Structured Essay

Answer all the four questions on this paper itself.

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

The Sri Lankan national cricket team played their first Test match on 17 February 1982 against England.

Record Groups

- Team records
- Individual records
- Partnership records

Partnership records



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.

Highest wicket partnerships

Runs	Wicket	Partners
335	1st wicket	Marvan Atapattu Sanath Jayasuriya
576	2nd wicket	Sanath Jayasuriya Roshan Mahanama

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".

<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>
 <.....>
 Team records
 Individual records
 Partnership records
 <.....>
 <.....>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>

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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.

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(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?



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

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(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.

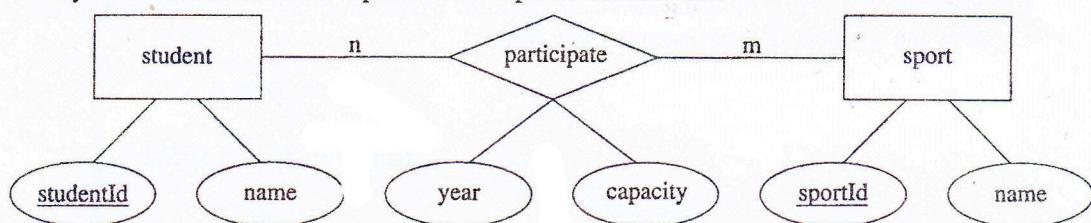
(b) Give four (4) different examples for the following electronic business types:

Type	Example
B2B	
B2C	
C2C	
C2B	

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

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- (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.

යියය ම හිමිකම අවරුණ / මුද්‍රා පත්‍රප්‍රමාණයෙන් / All Rights Reserved]

මෙම විගණ දෙපාර්තමේන්තුව සි ලංකා විශාල දෙපාර්තමේන්තුව විගණ දෙපාර්තමේන්තුව සි ලංකා විගණ දෙපාර්තමේන්තුව
ඩීප්‍රෝෆ්‍රේස්ත් ත්‍රිකොළඹ නිවැන්ස්කුප්පාර් ප්‍රාන්තයේ ත්‍රිකොළඹ නිවැන්ස්කුප්පාර් ප්‍රාන්තයේ
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka

අධ්‍යාපන පොදු සහතික පත්‍ර (පුස්ස පෙල) විභාගය, 2013 ආගෝස්තු
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General Certificate of Education (Adv. Level) Examination, August 2013

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ප්‍රතිය පාටත්තිල්ලම
New Syllabus

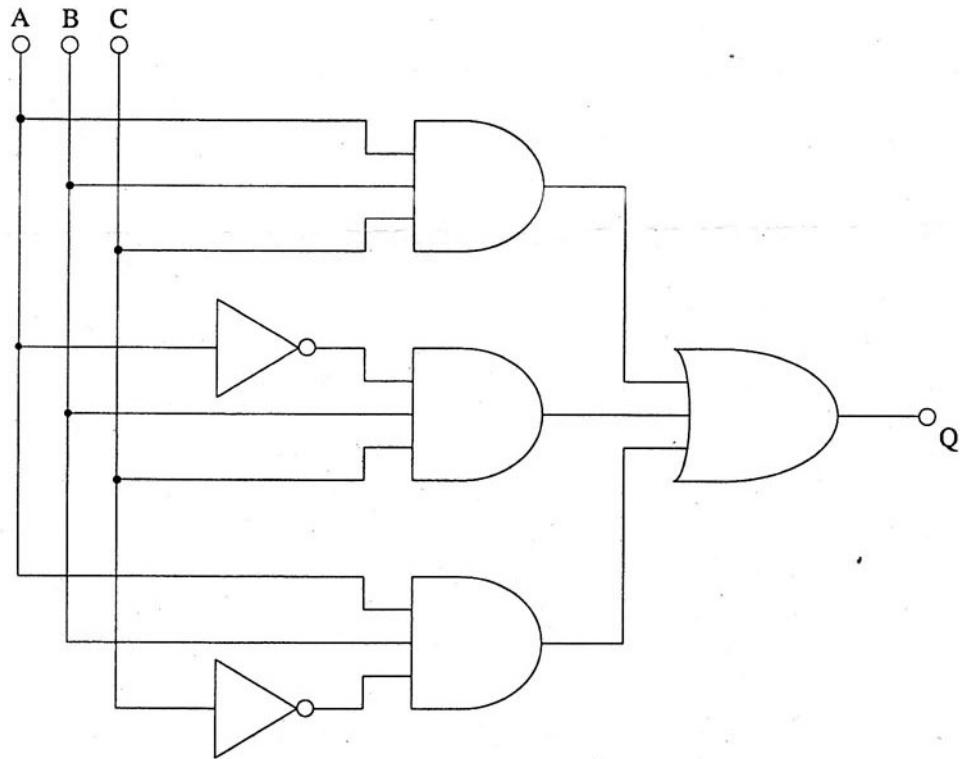
තොරතුරු හා සන්නිවේදන තාක්ෂණය II
තකවල්, තොටර්පාටල් තොழිලුප්පාවියල් II
Information & Communication Technology II

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Part B

* Answer any four questions only.

- (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.
 - Construct the truth table to represent the functionality of the above fire alarm system.
 - 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:



- Write and simplify the Boolean expression for the above circuit using Boolean algebra. Show all the workings and algebraic rules used for the simplification.
- 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.
- Identify two functional requirements of the proposed computer based system. Justify your answer.
 - State two non functional requirements of the system with justifications.
 - Discuss, giving two reasons, whether the general manager's decision to computerize the sorting process is correct or not.

* * *