AL/2013/20/E-I

| නව නිර්දේශය புதிய பாடத்திட்டம் New Syllabus |

තොරතුරු හා සන්නිවේදන තාක්ෂණය   I
தகவல், தொடர்பாடல் தொழினுட்பவியல்   I   **20** **E** **I**   පැය දෙකයි இரண்டு மணித்தியாலம்
Information & Communication Technology I   **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 (×) in accordance with the instructions given on the back of the answer sheet.

1. The Boolean expression $(x+y).(x+z)$ simplifies to ....
   - (1) x
   - (2) $x.(y+z)$
   - (3) $x.y.z$
   - (4) $x+y.z$
   - (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) $A'.B' + A.B'$
   - (2) $A'.B' + A.B$
   - (3) $A.B + A'.B'$
   - (4) $A'.B + A.B'$
   - (5) $A'.B + A'.B'$

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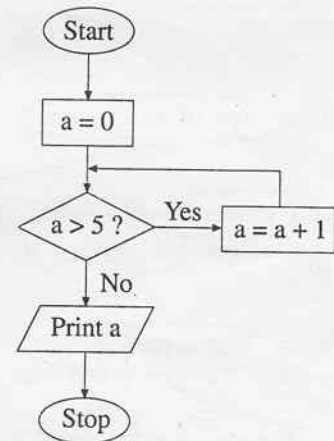
```
(5) function max(a, b):
        if(a > b):
            return a
        else:
            return b
```

● 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)
```

Start → a = 0 → a > 5 ? — Yes → a = a + 1 (loops back); No → Print a → Stop

20. The binary number equivalent to the 25_{10} is
    (1) 0100101.   (2) 0100111.   (3) 0011001.   (4) 0010110.   (5) 0010111.

21. $124_8 + 165_8 =$
    (1) 201_8 (2) 289_{10} (3) 289_8 (4) 311_8 (5) 389_8

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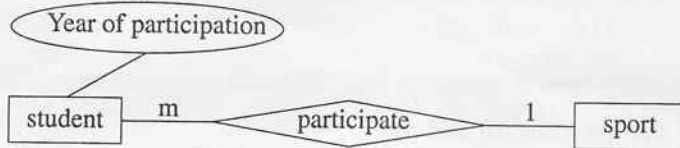   (1) A only   (2) C only   (3) A and B only
    (4) C and D only   (5) All A, B, C and D

23. Which of the following is the most appropriate Entity Relationship (ER) diagram to represent students' participation in different sports in school?
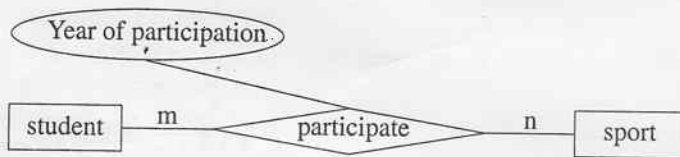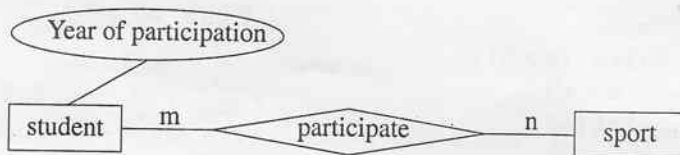
(1)
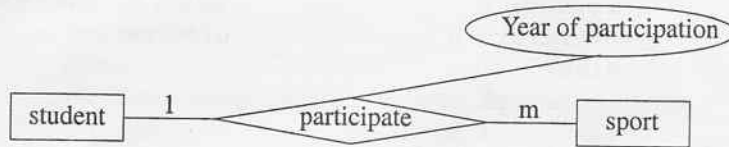
(2)

(3)

(4)

(5)
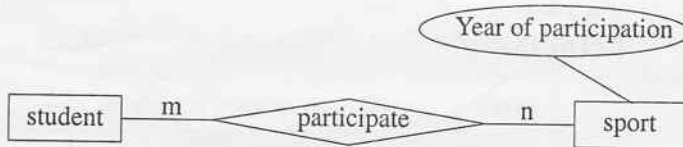
24. Which of the following can be considered as an expert system?
    (1) A bank teller machine
    (2) A fully automatic washing machine
    (3) A microwave oven
    (4) A diagnosis system of a health care facility
    (5) An electronic blood pressure meter

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:
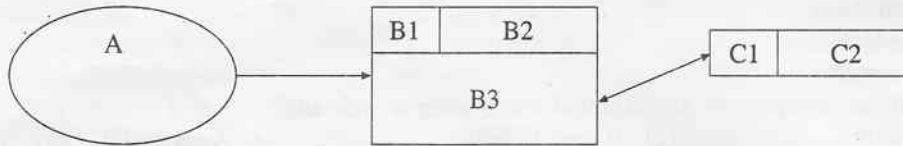
   In the above data flow diagram A, B3 and C2 represent .... respectively.
   Which of the following terms is the most appropriate to fill the blank?
   (1) a process, an external entity and a data store
   (2) an external entity, a process and a data store
   (3) an external entity, a data store and a 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
    ```

    (2)
    ```
    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 <br> 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 <br> 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

* * *

AL/2013/20/E-II

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2013 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2013 ஓகஸ்ற்
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** |

පැය තුනයි
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 - 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	

[see page two

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:
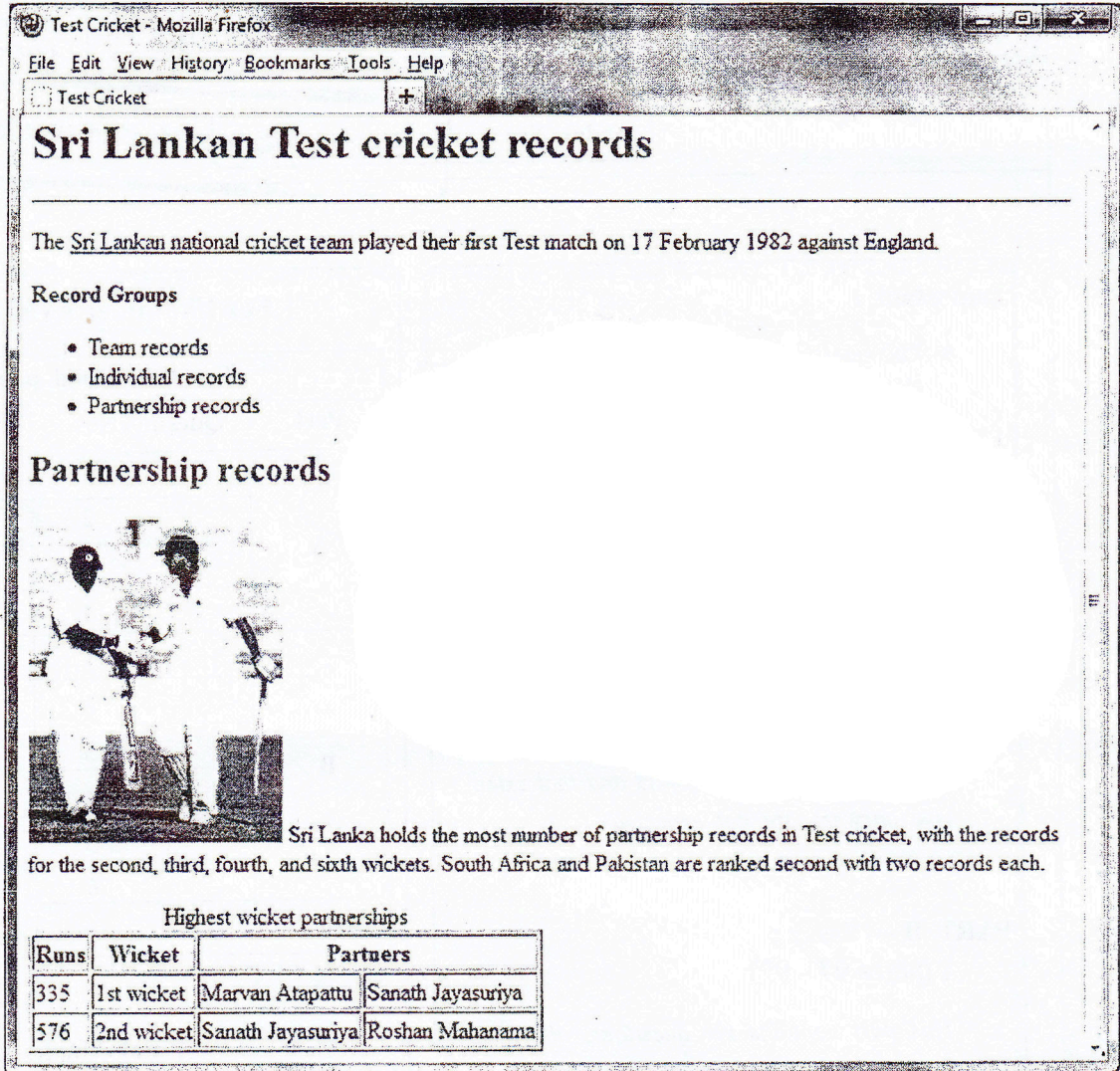

Figure : Web page

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
<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>
```

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.

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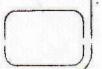
3. (a) (i) Convert 13_{10} and -19_{10} into two's complement numbers. Use 8-bits to represent a number.

(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.

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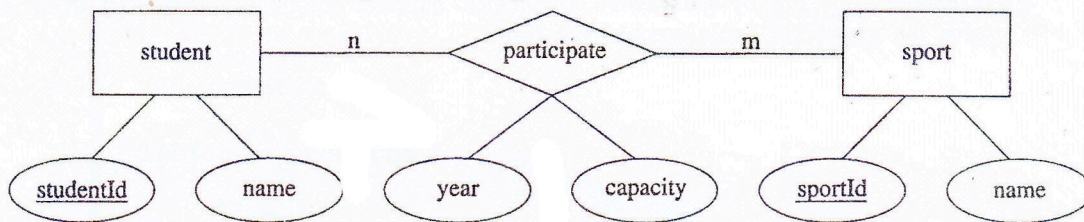
(c) Based on the table structures obtained in section 4 (b) above answer the following questions.

   (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.

※ ※

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:
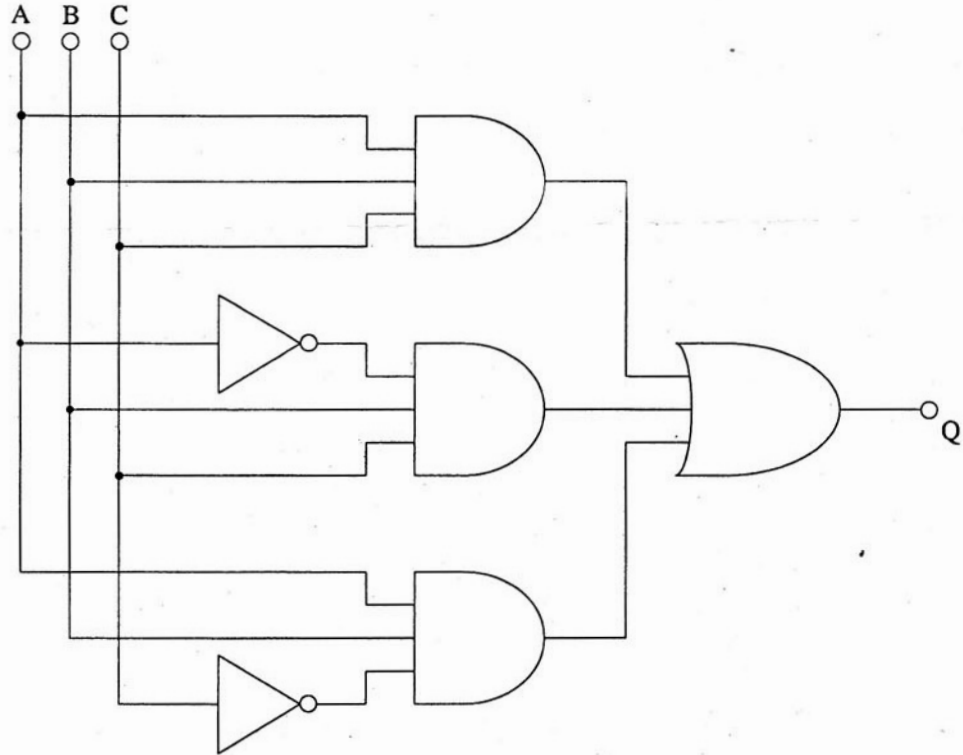
   (i) Write and simplify the Boolean expression for the above circuit using Boolean algebra. Show all the workings and algebric rules used for the simplification.

   (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).

[see page nine

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.

✳ ✳ ✳