

Department of Examinations - Sri Lanka

G.C.E. (A/L) Examination - 2017

## 20 - Information and Communication Technology

## Marking Scheme



This has been prepared for the use of marking examiners. Changes would be made according to the views presented at the Chief/Assistant Examiners' meeting.


## Instructions:

* Answer all the questlons.
* Write your Index Number in the space provided in the answer sheet.
* Instructions are also 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 on the answer sheet with a cross ( $x$ ) in accordance with the instructions given on the back of the answer sheet.
生 Use of calculators is not allowed.

1. Who proposed the stored program concept first?
(1) Lady Ada Augusta
(2) Charles Babbage
(3) Howard Aiken
(4) Blaise Pascal
(5) Von Ncumann
2. Which of the following components is generally secen outside the Central Processing Unit (CPU) of a computer?
(1) RAM
(2) Control Unit
(3) ALU
(4) General purpose registers
(5) L1 cache memory
3. What is the two's complement representation of 45 , if an integer is represented by 8 bits?
(1) 11010011
(2) 10110011
(3) 11001101
(4) 00101111
(5) 00101101
4. Which of the followings is another name for web publishing?
(1) Offline publishing
(2) Desktop publishing
(3) Media publishing
(4) Online publishing
(5) Self publishing
5. Which of the following secondary storage devices is generally considered to provide the fastest access to data!
(1) Compact Disc
(2) Digital Versatile Disc
(3) Internal hard disk
(4) Magnetic tape
(5) Floppy disk
6. Which of the followings is usually used to boot-up personal computers?
(1) Firmware
(2) Malware
(3) Adware
(4) Ransomware
(5) Liveware
7. Which of the followings is a main use of Complementary Metal-Oxide Semiconductor (CMOS) memory of a personal computer'?
(1) Keeping inputs for processing
(2) Holding instructions for operations
(3) Providing space for loading operating system
(4) Retaining information for output
(5) Keeping Basic Input Output System settings for the booting procedure
8. The execution of a series of non-interactive jobs on a personal computer with relative to the user is known as
(1) multiasking.
(2) multuuser processing.
(3) multiprocessing.
(4) batch processing.
(5) onlinc processing.
9. Which of the following numbers is equivalent to the binary number $101111_{2}$ ?
(1) $57{ }_{n}$
(2) 5716
(3) 5710
(4) 5916
(5) $5 \mathrm{~F}_{\mathrm{Ls}}$
10. $5 \mathrm{D}_{16}+10111_{2}=$
(1) 73
(2) 75
(3) 116
(4) $163_{8}$
(5) 164
11. What is the binary representation of $9.25_{10}$ ?
(1) 1110011101
(2) 00001001.01
(3) 0000100101
(4) 1000100101
(5) 10001001.01
12. A $\qquad$ . on motherboard is used to expand the functionality of in computer,
Which of the followings is the most appropriate to fill In the blank In the above statement'?
(1) Bus
(2) Clock
(3) RAM
(4) Slot
(5) ROM
13. Consider the following HTML code: <html>
<head>
$\langle$ <ttlocCountrieseltitle>
<head>
<body>
$\langle><!-\langle h l>$ Sri Lanka $\langle h 1\rangle \rightarrow\langle | p$
$\langle$ body $>$
<html>
Which of the followings correctly describes the display, when the above code is rendered?
(1) The text "Country" appears on the title bar and the text "Sri Lanka" appears as a header.
(2) The text "Sri Lanka" appears on the title bar and the text "Country" appears as a header.
(3) The text "Country" appears on the titte bar.
(4) The text "<!-chl> Sri Lanka $<\mathrm{h} l>->"$ appears on the title bar.
(5) The text "<l-<hl> Sri Lanka $<\mathrm{h} \mid \gg$ " appears in the body of the web page.
14. Consider the "Submit" button of an HTML form given below:

## 

Which of the following tags/elements correctly implements the intended function of the above "Subm button?
(1) <input type $=$ "submit" value $=$ "Submit">
(2) <input type $=$ "button" value $=$ "Submit">
(3) <button type $=$ "button" $>$ Submit<l button>
(4) <button type $=$ "submit">el buttor>
(5) <button type $=$ "submit" value $=$ "Submit" $><$ button>
15. Which of the following CSS rules renders the image in the file "school.png" as the background of a web pag
(1) body $\{$ background $=$ "school.png"; \}
(2) body \{ background: unl ("school.png"); \}
(3) body \{ background-image $=$ "school.png"; \}
(4) body \{ background-image: "school.png"; \}
(5) body \{ background-image: url ("school.png"); \}
16. In electronic mail systems, the protocol used by mail clients to retrieve messages from the mail server is
(1) Simple Mail Transfer Protocol (SMTP).
(2) File Transfer Protocol (FTP).
(3) Internet Control Message Protocol (ICMP).
(4) Internet Message Access Protocol (IMAP).
(5) TeInet.
17. The transport layer protocol User Datagram Protowol (UDP) can be used for
(1) reliable communication,
(2) guaranteed delivery.
(3) connection oriented communication.
(4) ordered delivery.
(5) exchanging state information among routers.
18. Which of the following statements regarding MAC addresses is correct?
(1) Every network device has a unique MAC address.
(2) Every network host has a unique MAC uddress.
(3) Every network interface has a unique MAC address.
(4) It is assigned for a device at the tlme of installation.
(5) It is used for routing.
19. The first and the last IP addresses of a subnet are 192.192 .48 .0 and 192.192 .63 .255 respectively. Which 1 the followings is the subnet mask of this subnet?
(1) 255.255 .255 .0
(2) 255.255 .192 .0
(3) 255.255 .255 .192
(4) 255.255 .240 .0
(5) 255.240 .0 .0
2. 17216.4820024 is a
(1) hast adtess in a class B network.
(2) network address of a class $C$ network.
(3) Bast aditress in 172.16.48.0224 subnet.
(4) network address of a subnet with 255 hosts.
(5) host sderess with 8 network bits.
21. Ia TCPIP computer networks, Transport Protucol Data Unit (TPDU) is referred to as a
(1) packet
(2) frame.
(3) segment.
(4) window.
(5) message.
2. Which of the following statements best describes a nice to have non-functional requirement of an Automated Teller Machine (ATM)?
(1) System shall facilitate users to withdraw money.
(2) System should let users to deposit money.
(3) System shall we 256 -bit encryption for all communications.
(4) System should provide users a touch screen interface.
(5) System shall dispense money within 5 seconds.
23. The following symbol, appeared in a Data Flow Diagram (DFD) of a Sales Information System, represents a
$\qquad$ containing payment details.

```
T1(M)}\mathrm{ Payment
```

Which of the followings is most appropriate to fill in the blank in the above statement?
(1) file tray .
(2) cardboard file
(3) tile cabinet
(4) data file in a hard disk
(5) temporary data file in a hard disk
24. Which of the following dataflow diagrams is correct with respect to the rules of dataflow modeling?
(1)

(2)

(3)

(4)

(5)

25. Consider the following flow chart:


What is the error with the above flow chart?
(1) It has two end symbols.
(2) Print is not a valid keyword.
(3) It has to process box.
(4) It has two print symbols.
(5) A flow direction is not correct.
26. Which of the following statements is true about e-business?
(1) It is a business process which conducts partially on online.
(2) It consists of front-end and back-end online processes.
(3) All 'brick vendors' conduct their business on online.
(4) Any e-commerce application is an e-business application.
(5) Any e-business application is an e-commerce application.
27. Students in a school are given tablet computers to improve their studies. Which of the followings is the most appropriate activity to achieve this objective?
(1) Downloading computerized study material
(2) Watching entertainment videcs
(3) Instant messaging among friends
(4) Blog writing
(5) Playing computer games
28. Which of the following statements is true about Artificial Intelligence?
(1) Inference Engine in an Expert System completely mimics human decision making process.
(2) Knowledge Base in an Expert System consists only the primary knowledge of an expert.
(3) Expert systems are always implemented by using Genetic Algorithms.
(4) Genetic Algorithms provide only one solution to a given problem.
(5) Genetic Algorithm evolves a solution for a given problem over a number of iterations.
29. Which of the following statements is true about algorithms?
(1) A set of steps used to solve a problem is called an algorithm.
(2) A sequence of activities used to solve a problem is called an algorithm.
(3) To solve any problem, there can be at most one algorithm.
(4) An algorithm can contain an infinite number of steps.
(5) An algorithm does not need to terminate within a finite time.
30. Requirements of a system can be classified as Mandatory (Essential), Desirable (Optiona), Functional and Non-functional.
"ATM of a bank shall not allow more than three attempts to enter a user's secret number incorrectiy" Which of the followings correctly classifies the above requirement?
(1) Mandatory, Functional
(2) Mandatory, Non-functional
(3) Desirable, Functional
(4) Desirable, Non-functional
(5) Mandatory or Desirable, Functional

- Consider the following relation to answer questions 31 and 32:

Suudent (index_no, national_id_no, name, date_of_birth, gender, blood_group)
where index no is a unique attribute and the name attribute fully depends on the index_no attribute.
31. Which of the following statements is correct with respect to the normal form of the above relation?
(1) It is in the zero normal form.
(2) It is in the first normal form.
(3) It is in the second normal form.
(4) It is in the third normal form.
(5) Its normal form cannot be decided.
32. Which of the followings can be a candidate key of the above relation?
(1) national_id_no
(2) name
(3) date_of_birth
(4) gender
(5) blood_group

- Consider the following relations to answer questions 33 to 36 :
book (book_no, title, publisher, edition)
author (author_id, name, email_address)
bookAuthor (book_no, author_id)
where book_no and author_id are unique attributes in the relations book and author respectively.

33. Which of the following statements is correct with respect to the relation bookAuthor?
(1) book_no is the primary key.
(2) author id is the primary key.
(3) Any single attribute can be a candidate key.
(4) author_id is a candidate key.
(5) book_no is a part of the primary key.
34. Which of the following Entity Relationship (ER) diagrams correctly represents the relationship between the entities represented by the above relations?
(1)

(3)

(4)

35. Assume that above relations are converted into tables in a relational database. The following SQL query is executed on the database:

## SELECT * FROM bookAuthor

Which of the following statements is correct regarding the output of the above SQL query?
(1) It cannot be an empty table.
(2) title column is in it.
(3) name column is in it.
(4) All the tables book, author and bookAuthor are used to produce the output.
(5) All records in the bookAuthor table are in the output.
36. Consider the following statements regarding the Data Definition Language (DDL) used to create the table bookAuthor while maintaining data integrity:
A - It has a primary key constraint.
B - Il has a foreign key constraint.
C - It has a domain constraint.
Which of the above statement/s is/are correct?
(1) A only
(2) A and B only
(4) B and C only
(5) All A, B and C
(3) A and C only
37. Which of the following organs is a part of a closed system of the human body?
(1) Eye
(2) Ear
(3) Heart
(4) Kidney
(5) Lung
3. Which of the following statements is correct?
(1) Application software load applications into the main memory.
(2) The programs stored in ROM are known as system software.
(3) System sotware support data communication between peripheral devices.
(4) Utility software is generally stored in ROM.
(5) Utility software are incorporated in washing machines.
39. Consider the following data input devices:

A - On screen keyboard (virtual keyboard)
B - Bar code reader
C. - Magnetic card reader

Which of the above devices can be used to input data more efficiently?
(1) A only
(2) B only
(3) C only
(4) A and B only
(5) B and C only
40. Consider the following statements regarding CSS used in HTML;

A - One style sheet can define the rendering of HTML elements in multiple documents.
B - No additional download is nceded to import style sheets.
C - The HTML document must include a <linla tag.
D - The style attribute is required in the relevant elemem.
Which of the above statements are correct when using External Style Sheets?
(1) A and B only
(2) A and C only
(3) B and D only
(4) A, C and D only
(5) B, C and D only
41. Which of the following statements about Python data types/expressions is correct?
(1) String is a mutable data type.
(2) List is an immutable data type.
(3) $[1,2,3]$ is a tuple.
(4) The expression [1, 2, 3] [1] will produce [2] when executed.
(5) The type of $\left\{a^{\prime} \mathrm{a}^{\prime}: 1, \mathrm{I}:(1,2)\right\}$ is a Dictionary.
42. Consider the following values:

A - 2.3e2
B - TRUE
C - "This isn't a string"
D - "
Which of the above values are valid in Python?
(1) A and B only
(2) A and C only
(3) B and C only
(4) A, B and C only
(5) A, C and D only
43. Consider the following Python statement:
temp $=[1,2,3,4,5,6][2:: 2]$
Which of the followings is the value of the variable temp after executing the above statement?
(1) $2,4,6$
(2) 3,5
(3) $[2,3]$
(4) $[3,5]$
(5) $[2,4,6]$
44. Consider the following statements:

A - $\quad a=b=2+3$
B - $\quad a, b=2,3$
C - $\quad a, b=(2,3)$
D - $\quad a=(2,3)$
Which of the above are valid assignment statements in Python?
(1) A and B only
(2) B and C only
(4) A, B and C only
(5) All A, B, C and D
(3) C and D only
45. Consider the following Python expressions:

A - True or False and True
B . $3>2$ and False
C $-\{2,3\}=\{3,2\}$
D $-(2,3)=(3,2)$
Which of the above expressions would result in the Boolean value True?
(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
46. The content of two files with names "in.csv" and "out.csv" are shown in the figures "Fig. 1" and "Fig. 2" respectively.

Ruvan, 20,50
Ramesh, 0,5
Raj, 10, 10
Fig. I: incss

Ruvan 205070
Ramesh 055
Raj 101020
Fig. 2: out.csv

Which of the following Python programs can be used to transform the data in "in.csv" to the content of the file "out.csv"?

| (1) ```f1=open("in.csv", "r") f2=open("out.csv", "r") for line in fl: items=line.strip().split(",") tot=int(items[1])+int(items[2]) print(items[0], items[1], items[2], tot, file = f2) f1.close() f2.close()``` | (2) ```fl=open("in.csv", "r"). f2=open("outcsv", "w") for line in f1: items=line.strip() tot=int(items[1])+int(items[2]) print(items[0], items[1], items[2], tot) f1.close() f2.close()``` |
| :---: | :---: |
| ```(3)None``` | (4) ```fl=open("in.csv", "r") f2=open("outcsv", "w") for line in fl: items=line.strip(0.split(",") tot=items[1]+items[2] print(items[0], items[1], items[2], tot, file = f2) fl.close() f2.close()``` |
| ```(5) fl=open("in.csv", "r") f2=open("out.csv", "w") for line in fl: items=line.strip().split(",") tot=int(items[1])+int(items[2]) print(items[0], items[1], items[2], tot, file = f1) f1.close() f2.close()``` | $\cdots$ |

47. Consider the following statements on using NAND. NOR gates over NOT. AND, OR gates when constructing logic circuits:

A - They make logic circuit design simpler.
B . They help to construct logic circuits that consume less electricity.
C. They make logic circuit construction more economical.

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

48．Whth of the following functions gives the sum of all elements in any list of integers？
（1）tef for
$1=x|0|$ for 1 in range $(0, \operatorname{len}(x)$ ）： $\mathrm{n}=\mathrm{y}+1$ retums
（ 2 ） $\operatorname{def} f(x)$ ： $s=\boldsymbol{x}[0]$
for 1 in range $(1, \operatorname{len}(x))$ ：
$\mathrm{y}=\mathrm{s}+\mathrm{i}$
retum s
（3） $\operatorname{def} f(x)$ ：
$\mathrm{s}=0$ for i in x ： $\mathrm{s}=\mathrm{s}+\mathrm{i}$
return S
（4）def $f(x)$ ：
$a=0$
for 1 in $x$ ：
$\mathrm{n}-\mathrm{y}+\mathrm{x}$［1］
returns
（5） $\operatorname{def} f(x)$ ：
$\mathrm{s}=0$
$1=0$
while $i<\operatorname{len}(x)$ ：
$8=5+x[i]$
return s

49．Oonsider the following system implementation methods：
A ．Direot
H－Plot
C．Panaliel
Which of the above method（s）Is／nre genemilly used to implement a home security system？
（1）A only
（2）B only
（3）C only
（4）A and B only
（5）A and C only

50．Oonsider the following elauses：
A－can response to relevant enviromment changes
B－alwnys acts according to well－defined user instructions
C－performs only pre－defined set of tasks
D－can make decisious under incomplete information
Which of the above can be considered as properties of software agent system？
（1）A and B only
（2）A and C only
（3）A and D only
（4）B and C only
（5）C and D only

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| Q. <br> No. | Answer |
| :---: | :---: |
| 1. | 5 |
| 2. | 1 |
| 3. | 5 |
| 4. | 4 |
| 5. | 3 |
| 6. | 1 |
| 7. | 5 |
| 8. | All |
| 9. | 1 |
| 10. | 5 |


| Q. <br> No. | Answer |
| :---: | :---: |
| 11. | 2 |
| 12. | 4 |
| 13. | All |
| 14. | 1 |
| 15. | 5 |
| 16. | 4 |
| 17. | 5 |
| 18. | 3 |
| 19. | 4 |
| 20. | 3 |


| Q. <br> No. | Answer |
| :---: | :---: |
| 21. | 3 |
| 22. | 4 |
| 23. | 1 |
| 24. | 3 |
| 25. | 5 |
| 26. | 2,4 |
| 27. | 1 |
| 28. | 5 |
| 29. | 2 |
| 30. | 2 |


| Q. <br> No. | Answer |
| :---: | :---: |
| 31. | 4 |
| 32. | 1 |
| 33. | 5 |
| 34. | 4 |
| 35. | 5 |
| 36. | 5 |
| 37. | 3 |
| 38. | 3 |
| 39. | 5 |
| 40. | 2 |


| Q. <br> No. | Answer |
| :---: | :---: |
| 41. | 5 |
| 42. | 2 |
| 43. | 4 |
| 44. | 5 |
| 45. | 2 |
| 46. | 3 |
| 47. | 5 |
| 48. | 3 |
| 49. | 5 |
| 50. | 3 |

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

1. Fill in the blanks in the following Data Flow Diagram (Figure 1.1) of the sales information system of a company called Bookland, only by using the words in Boldface in the description given below.
Bookland is a book store that specializes in selling rare books, which are usually not available from other sources. As a practice, Bookland maintains just a one copy of any book at a time due to the higher price of rare books.
Typically, a customer makes a book enquiry over the phone from the Sales Assistant at Bookland. She then goes through book details in the Inventory file to check whether such a book is in their stock. If the details of the book is found in the Inventory file, the Sales Assistant then refers to the Hold-on Requests tray to make sure that the book status is 'available' and makes a reply to the enquiry. If the book status is 'available' and the customer wishes to reserve the book, she then takes customer's personal details and places a hold-on request against that book in the Hold-on Requests tray making the book no longer available:
When the customer comes to make the paymient and collect the book, the Cashier at Bookland refers to the Hold-on Requests tray and finds the relevant hold-on request made by the customer. If there is a valid hold-on' request, she then accepts the payment from the customer, issues a payment recelpt to the customet and finalizes the sale. The customer is then allowed to take away the book. The Cashice also files the copy of the payment receipt in the Sales file, uses it at the end of the day to compile a sales report and sends it to the Owner of Be Bookland. After every sale, the Cashier updates the book details in the Inventory file and keeps the stock up to date. When the Owner supplies books to Bookland, he serds details of books to Cashier and the Cashier adds them one by one to the Inventory file.


Figure 1.1: Level 1 Data Flow Diagram of Sales Information System of Bookland
2. (a) In an operating system, what are the events that change the state of a process in the 'running' state?
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(b) Explain the main actions performed by an operating system during context switching.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(c) Explain what will happen during the booting process of a computer.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
3. (a) (i) Write three key conditions to be satisfied in order to classify a transaction/service between two persons as B2B in e-commerce.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(ii) If the seller in the above transaction is replaced by a software agent, state the key proactive behaviour that software agent shall have.
(b) The following SQL statement has been used to create a table in a database.
create table student'(
stadent_no char(5),
name char(30). address char( 100 ), primary key (student_no) )
(i) Write a query in SQL to add the following data to the student table.

Student number - 10001
Name - Saman Kumara
Address $\quad-78$, Mahara road, Maharagama
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(ii) If the address of the student entered in the (i) above should be changed to 13. School Lane, Jaffina, write a query in SQL to update the relevant record in the student table.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
4. (a) (i) The Figure 4.1 represents an open system. Using the basic components: input, process, output and system boundary 'as given in the figure, draw a diagram to represent a closed system.


Figure 4.1: An open system
(ii) Explain the reason for drawing the diagram which you drew for (i) above.
$\qquad$
(b) A person can own one or more mobile phones. One mobile phone belongs to a single person only. Assume that a mobile phone can be uniquely identified by its telephone number. National Identioy Cand number (NIC No) is used to identify a person uniquely.
Above statements are represented by the ER diagram in Figure 4.2.


Figure 4.2: ER diagram
Convert the above ER diagram into 3rd Normal Form relations to be implemented in relational database.

## Information and Communication Technology (20) Paper II Part A 2017



| 2.(a) | - Termination (end) of the process <br> - Time out (end of the time slice) <br> - Blocked for input/output operation | 1×3 |
| :---: | :---: | :---: |
| 2.(b) | - Store the current state of the running process in the $P C B$. <br> - Load the state of the process to be continued to the CPU from the <br> - Transfer the control to the process to be continued. | $\begin{aligned} & 1 \\ & 2 \text { or } 0 \\ & 1 \end{aligned}$ |
| 2.(c) | - Power on self test (POST)/Executing or running BIOS <br> - Run the bootstrap program to load the $O / S$ to the main memory. <br> - Transfer the control to the $\mathrm{O} / \mathrm{S}$. | $\begin{array}{\|r\|} \hline 1 \times 3 \\ 3 \\ \hline \end{array}$ |
| 3.(a).(i) | A transaction between two persons can be classified as B 2 B if following conditions are satisfied (Intrount also oley) <br> 1. It should be an online service/transaction, <br> 2. The buyer should be a business user <br> 3. The seller should be a business user | $1 \times 3$ |
| 3.(a).(ii) | If the seller is replaced by a software agent, then agent represents a business user. Therefore, main proactive behavior is to take actions that makes high business profit. lacresposay / Simponntater) ousty | $\begin{array}{\|c\|} \hline 200 \theta \\ 1 \\ \hline \end{array}$ |
| 3.(b).(i) | [A only] [A and B only] [A,B and C] values('10001', 'Saman Kumara', '78, Mahara road, Maharagama') insert into student (student_no, name, address) values('10001', 'Saman Kumara', '78, Mahara road, Maharagama') The order of the values in the values statement should be same as the order of attributes in insert statement. Note: All names should be as in the table definition. | 1 <br> 2 3 <br> 3 |
| 3.(b).(ii) | update student <br> or $\begin{aligned} & \text { update student } \\ & \text { set address = '13, School Lane, Jaffna' I Imark } 2 \\ & \text { where student_no like '10001' F 1mark } \end{aligned}$ | $12$ <br> 1 |



 Information \& Communication Technology


- Answer ary foor questions cosy.


## Part B

1. A switch (A), a tempersture senser (B) and a timer (C) of an air-coositioner determine turned on and turned of states of the sir-conditioner. Truned on and turped off tetes of the eir-conditioner as well as the 'ON' 0 , respectively.
The air-conditiooer can be turned on or off manselly by seming the switch to its 'ON' or 'OFF' states, respectively.
The tamperature senser detecss the tempershure in the roce. The temperature sensor sets its state as 'ON' or "OFF' when the detecend temperature is respectively higher or lower than a pre-defined temperature value. The air-coolitioner is amomatically taned on or off when the detected temperature is respectively higher or lower than the predelined temperature value.
The timer sets its stase as 'OFF' until it reaches a preset time value and sets the state as 'ON' once it reached. The air-conditioner is antomatically turned off roben the timer reaches the preset time value.
(a) Construct a logic circuit using ocly NOR gotes to coctrol the air-conditioner. Cleariy show truth table, Boclean expression and Bodean algetraic rules ased for simplification. Assume that the electricity is always supplied to the gis-conaficoer.
(b) The user of the air-conditicner says thet the switeh is not required for the operation of the air-conditioner. Do you agroe with this statemeet? Instify your enswer.
2. A "Demilitarized Zone (DMED" is a suboet that coctains and exposes an organization's external-facing services such as web servers (putic IP sdinesses) to the Irternet while hiding away the rest of the network behind a firewall (using local IP sdiresses).
A derwork with a DME belonging to an ogzarization bas been assigned the public IP address range 123.45 .67 .0 with suboer mank 255255255274 . The DMZ contaiss the web server and the mail server. It has 4 additional subcess for insernal use baving the private IP adtress range 10.0 .00 with the subnet mask 255.00 .0 . Computers in each suboer can scoess resources in all other subpets. The organization decided to connect the 4 subnets to the Internar through a proxy server. There is also an application server for its intemal clients.
Ldectify the devices required to extabish this network and draw a network diagram to show the logical arrangement of the organimation's computer networt Show all the elements of the network with appropriate IP adrasses. Clearly show all calculations stating assumptions you made.
Further, it is also required to explain the changes done to an IP packet released by a computer to a subnet by the proxy server when it travels to the Internet.
3. A state bealth anthority decided to conturi an awreness program as an online service through Internet to reduce deagre infection by transmission of the virus through the mosquitoes. This service provides information ca bow to adopt dengue costrol apprcaches, such as cleaming the environment, destroying non-essential cocrainers that provide lanva bakitass etc, in order to minimize mosquitoes' propagation.
(a) To which ecocmerce type does this service belong?
(b) If the service is extended by allowing organirations to register their services targeting minimizing the spread, what is the e-comenerce ype of this extended service? Justify your answer.
(c) Assume that a registered onganisstion provides a senvice for itself to submit the details of the identified dengue treating places to the state authority ooline. Why is this service not rightly considered as B2B? What is the cocrect e-commerce type of this service?
(4) An coper sysem is proposed in develop policies to fine the owters of the lockorss where cerg.

 tose of the exper system. (Hitr The conibision of oxe expent bxin process of the che exper).
4. The ansempion of elecricing $2 x$ bouses is charged besed on the number of units consimed. The fint 64 wis me cherged an Re 5000 per wit med the rest at Rs. 1000 per uit
 tron a houstobider whe the household momber and prosent and the proviona reabings of the electicity ment se given.
(6) Encuie the zyoitm given in the (2) above in Pytron programing keguge. Szte at vaid axmpocos. 17 zes.
(c) Develcy a facion in Pybon to write bowehoid mober, meter rading axd the total amoun to be charged 2 the end of an exising text fle mamed "debtri".
5. The candues who have been selected for univerity entrace sbould regiter for the give academic year with the uriversity given to then. Caxidates who do not regisen before the 'Lat dere' anmomod by each utiversity will lose their crivensity entrance. Once a candidete regivers with the given wivenity, the candiate tecomes a registered student of that uiversity. Reginered stadets can apply for finecial rupport, soch as Mahapola sholanstips and Bursery, seperately. These financiel ruppors could be either full or partial. All registerd stiderts will rexive a laptop. Howere, its comersip canct be trasferved to ancther student. The axer requiment of the above system ar fistod below. A oser thall be able to obtin
(a) a list of stodents regisered for a given acadenic year with a given uiversity.
(b) information (soch as model, serisl namber and mzramy period) abora the laptops given to each strifect.
(c) list of students who sppilied for firancial support.

Draw an Ettity Relationstip (ER) diagram required to design a databe to represent the above syster description and to sttisfy the user requrremens. State a.l your assmptions elearly.
6. Envircemental Institute of Colombo imends to develop a website to provide information on an ar competition for students. A web page from this website and anocher web page with the entry form to register for the competition are shom in the Figure 6.1 and Figure 62 respectively.


Figure 6.1: A web page of the welsiz
(a) Using appropriate HTML tags, create an HTML file regcined to rende the web pag $x$ sem $=$ Figre 61 Your code should satisfy the following requirements.
It is required to format the text of the list in 'Calibri' fort, 14 poits tigh, 1 ade coicr. The lace stodl be bulleted with squares. Format the list by using internal or exterme stie shees ony.
Further, when a user clicks on the hypertext 'online entry form' oo the wob pege the may foem guen in Figure 6.2 should be rendered on a new tabpage. Assume that the rane of the Mra. Es of te web page with the entry form is 'formhent".


Theme: Litter on the envirommeat
$\mathrm{N}=$
Gendar: © Mate © Female
Gade Catacory Grade 1-2
Art modir
$\square$ Wian Colomes
$\triangle$ Cobare Pancis
-Cayon
$\square$ Civk


Figure 62: Entry form
(b) Using appropriate HTML tags, create an HTML file to render the entry form given in Higure 6.2. The options for 'Grade Category' are given in the Figure 63. Your code should satisfy the following requirements. When the 'Clear your Entries' button is clicked, all the entries of the form should te cleared. Similarly, when the 'Submit' button is clicked, the form should be submitted to the server.


Figure 6.3: Options for Grade Category

Information and Communication Technology (20)

## Paper II Part B

 2017

Assume that the entire private address range is used (it can be any range)

Since there are 4 subnets, it is required to divide the address range into 4 segments. For this, add two more bits to the subnet mask.
Subnet mask length bocomes 10.
11111111.11000000 .00000000 .00000000

Therefore, the 4 subnets would bo:

1. $00001010.00000000 .00000000 .00000000=10.0 .0 .0 / 10$
2. $00001010.01000000 .00000000 .00000000=10.64 .0 .0 / 10$
3. $00001010.10000000 .00000000 .00000000=10.128 .0 .0 / 1010$
(If they declde to use $/ 24$ ranges, they should assume that 255 addresses are enough for each subnet. Then they should show the salection of / 24 ranges.)

Note: If the selected ranges are shown in the dlagram these 4 marks can be given

Needed Devices: 05 Hubs, Switch, Router, Firewall, Web Server, Mail Server, Proxy server, Application Server.


Since any computer in any subnetwork can access resources in all subnetworks, the application server can be established in any subnetwork. Since it is for Internal clients, it should not be located in the DMZ.

Note: 1.Proxy Server could be directly connect to the Switch
When the packet goes to the proxy server, its source IP address is rewritten with the public IP address of proxy server.

| 3.(a) | G2C or Government to Consumer/ $\mathrm{Cl}+120$ drow | 3 |
| :---: | :---: | :---: |
| 3.(b) | G2B or G2E, <br> It is a service provided in online by the Government to Business or Employees. |  |
| 3.(c) | Because it is a service provided by business to government. Therefore it is B2G. |  |
| 3.(d) | Law: To prepare fine calculations mechanism according to the (criticality of the identified place). <br> Epidemic Control DNision: (To develop formula to measure the criticallty of the identified place related to dengue breeding). | $\begin{array}{\|ll\|} \hline 3 & \\ \hline & \\ 2 & \\ & \\ \hline \end{array}$ |



6.(a) <html>
<head>

<meta charset="utf-8">
<title>information</title>

<style> OR <style type="text/css">
lif
font-family: calibri;
font-size: 14pt;
color: red;
list-style: square;
\} </style>
OR <link rel="stylesheet" type="text/css" href="def.css"> </head>

<body>
<h1>Student Art Competition</h1>
<h2>Theme: Litter on the environment </h2> <h3>PRIZES</h3> <ul>
<li>1st place Rs. \(10,000 /=</ \mathrm{li}>\)
<li>2nd place Rs. \(7,500 /=</ \mathrm{li}>\)
<li>3rd place Rs. 5,000/=</li>
</ul>
<h3>ENTRY FORM</h3>
<p>Please fill and submit this <a href = "form.html" target = _blank>
online entry form</a> to enter the competition. </P>
</body>
<ntml>
S(b) <html>
<head>
<meta charset="utf-8">
<title>Entry Form</title>
</head>
<body>
<h1>Art Competition Online Entry Form 2017</h1>
<h3>Theme: Litter on the environment</h3>
<form method = "get" action = "script.php">
<br/>
<input type="checkbox" name="media3" value="Crayon" > Crayon
<br/>
<input type="checkbox" name="media4" value="Chalk" > Chalk ]
<p><input type = "reset" value = "Clear your Entries"></p>
<p><input type="submit" value="Submit" ></p>
</form>
</body>
</html>

