අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2014 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2014 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2014

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.*
- * *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 on the answer sheet with a cross*** (×) *in accordance with the instructions given on the back of the answer sheet.*
- * *Use of calculators is* ***not*** *allowed.*

1 One of the principal inventors of the Electronic Numerical Integrator and Computer (ENIAC) was
(1) Blaise Pascal (2) Charles Babbage. (3) John Von Neumann.
(4) Ada Augesta Lovelace. (5) John Presper Eckert.

2. Which of the following statements is correct with respect to the evolution of computing devices?
(1) Vacuum tubes were used by Blaise Pascal to build the Pascaline.
(2) The Pascaline is considered as a first generation computing device.
(3) Computers built using vacuum tubes are considered as second generation computers.
(4) Electronic Numerical Integrator and Computer (ENIAC) was built using vacuum tubes.
(5) Apple I and Apple II are two examples for second generation computers.

3. Which of the following statements is true with respect to programming languages?
(1) Machine languages belong to the second generation programming languages.
(2) Assembly language programs can run directly on any computer.
(3) Assembly languages belong to the first generation programming languages.
(4) Assembly language is more human readable form of machine language.
(5) Machine language programs can be translated into assembly language programs by using assemblers.

4. Which of the following statements is true with respect to comments in programming languages?
(1) At the time of execution, comments are translated into special machine instructions.
(2) Comments should always be limited to a single line.
(3) Comments should start with the symbol # in all programming languages.
(4) It is a good practice to include comments in a program to explain its functionality.
(5) In Python programming, comments should always start at the first column.

5. Which of the followings is an **invalid** Python variable name?
(1) MyCountry (2) mycountry (3) My country (4) My_country (5) _my_country_

6. The decimal number equivalent to the 100111_2 is
(1) 40. (2) 39. (3) 38. (4) 37 (5) 36.

7 Which of the following converts digital data to analog data to transmit over an analog telephone network?
(1) Network Interface Card (NIC) (2) Modem
(3) Multiplexer (4) Bluetooth adaptor
(5) Wi-Fi card

8. A special digit inserted into a sequence of digits for data validation is called the ..... digit.
Which of the following is most appropriate to fill the blank in the above statement?
(1) check (2) sign (3) least significant
(4) most significant (5) error

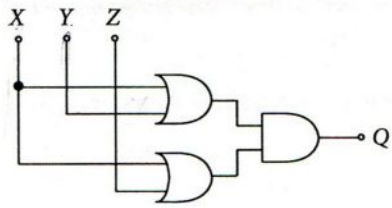
[See page two

9. The Sri Lankan cricket team won the T-20 World Cup-2014 tournament. The Sri Lankan cricket fans had the highest value of this information when .....
   (1) the final match started.
   (2) Thisara Perera scored the winning run.
   (3) the captain Lasith Malinga received the trophy.
   (4) they saw the news on the newspapers.
   (5) they saw the cricket team at the Katunayaka Airport.

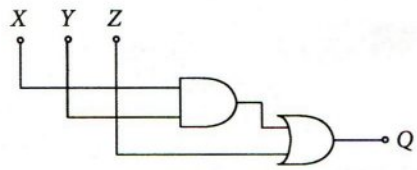
10. $4A6_{16} + 99_{10} =$
   (1) 615_{16} (2) 615_{10} (3) 509_{10} (4) 509_{16} (5) 659_{16}

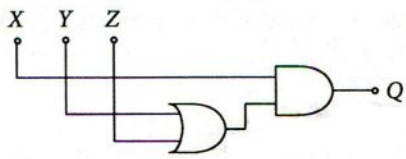
11 Representations of 5_{10} and -9_{10} in 8-bit Two's complement forms are
   (1) 00000101 and 11110111 respectively.
   (2) 11111011 and 11110111 respectively.
   (3) 00000101 and 10001001 respectively.
   (4) 00000101 and 11110110 respectively.
   (5) 11111011 and 11110110 respectively.

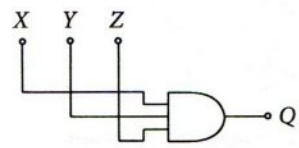
12. Consider the following logic circuit:

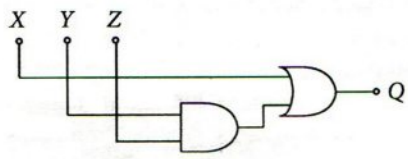


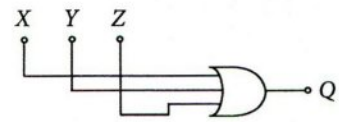
Which of the following circuit diagrams represents a simplified version of the above circuit?

(1)


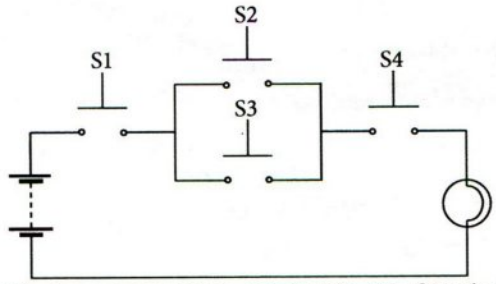
(2)


(3)


(4)


(5)


13. Consider the following circuit with four push button switches namely: S1, S2, S3, and S4. These four switches can either be in pushed or released states which are represented by 1 and 0 respectively. (Note: In the circuit given below, all the switches are in released state having value 0.)



Which of the following Boolean expressions represents the function of the bulb, if the on state of the bulb is represented by the value 1?
   (1) S1 + (S2 . S3) + S4 (2) (S1 + S2) . (S3 + S4) (3) (S1 . S2) + (S3 . S4)
   (4) S1 . S4 . (S2 + S3) (5) S2 + (S1 . S4) + S3

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14. Which of the following has the fastest access speed?
(1) Extended Memory (2) Register Memory (3) Flash Memory
(4) Cache Memory (5) Virtual Memory

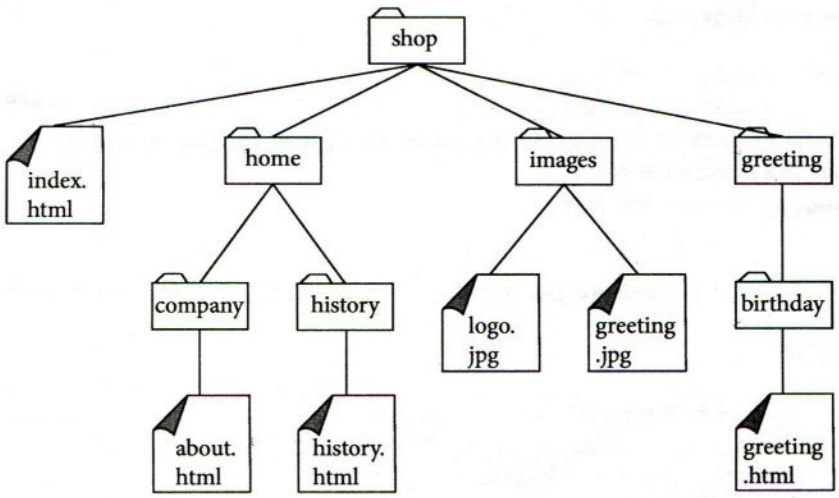
15. Which of the following is **not** a main function of an operating system?
(1) Memory Management (2) Process Scheduling (3) File Handling
(4) Virus Detection (5) User Interfacing

16. In an operating system, moving a process from the main memory to the secondary storage in order to bring in another process to the main memory is called .....
(1) Demand Paging. (2) Context Switching. (3) Swapping.
(4) Interrupting. (5) Scheduling.

17 The following element is a markup for including an image to an HTML document. The name of the source file of the image used is "arrow.jpg" which is in the same folder as the HTML document.

Which of the following is the most suitable to fill the blank in the above element?
(1) alt (2) src (3) scr (4) href (5) link

18. Consider the folder structure given below



Which of the followings is the correct markup to include in the index.html to link greeting.html document?
(1) Greeting
(2) Greeting
(3) Greeting
(4) Greeting
(5) Greeting

19. Which of the followings is a client-side scripting language that is commonly used to add interactivity to web pages?
(1) CSS (2) PHP (3) XML (4) HTML 2 (5) JavaScript

20. Consider the following HTML element:
<input type = text size = 10/>
The attribute 'size' on the above element refers to the .....
(1) length of the text box in pixels.
(2) maximum number of characters displayed in the text box.
(3) maximum number of characters that can be typed into the text box.
(4) font size of the text box.
(5) number of lines displayed in the text box.

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21 Facebook is a popular social network connecting millions of people with new members joining daily Which of the following statements is correct?
(1) Facebook plays a very important role in building and maintaining your family relationships.
(2) Facebook is the only social network available today.
(3) Privacy settings of Facebook assure the privacy of its users completely.
(4) Publishing private information in Facebook has resulted in unfortunate incidents.
(5) Real identity of a person is always guaranteed in Facebook.

22. Which of the following statements is true?
(1) Computer based learning is a teacher oriented learning technique.
(2) Skype is a famous video conferencing technique.
(3) Virtual Private Network (VPN) provides a medium for telecommuting.
(4) Conducting offline examinations can be considered as computer aided assessments.
(5) Microsoft Power Point is Free and Open Source Software (FOSS) for computer based presentations.

23. Computers attached to a LAN use the default gateway connected to the same network
(1) to translate the domain names to IP addresses.
(2) to forward IP packets when they do not know any specific route to the destination.
(3) as the firewall for the network.
(4) to send all the data packets to other computers in the same LAN
(5) to assign IP address to a computer on the LAN

24. Which of the following statements is true?
(1) www.ebay.com is an example for C2C.
(2) When the government renders its services to the public through www then it is called B2C.
(3) www.wikipedia.com is an example for C2B.
(4) www.amazon.com is an example for B2E.
(5) Facebook groups are examples for E2C.

25. The command that can be used to measure the round trip propagation delay between two computers on the Internet is
(1) ping. (2) ifconfig. (3) ssh. (4) ftp. (5) telnet.

26. In the OSI seven layer reference model, IP protocol maps to the layer.
Which of the following is most appropriate to fill the blank in the above statement?
(1) application (2) session (3) transport (4) network (5) physical

27 The function of the DHCP server in an IP network is to
(1) translate domain names to IP addresses. (2) cache the web pages.
(3) dynamically allocate IP addresses. (4) filter IP packets.
(5) provide security

28. Which of the following is a valid subnet mask?
(1) 255.255.255.192 (2) 255.0.255.0 (3) 256.255.255.64
(4) 255.256.255.96 (5) 0.0.0.255

29. The ping command indicates that there is a 5% packet loss between the computers *X* and *Y* There is an FTP server running on *Y* A file is downloaded to *X* from *Y* using FTP protocol. Which of the following is the most appropriate statement regarding this file download?
(1) The downloaded file has exactly 5% of the data missing.
(2) The downloaded file has more than 5% of the data missing.
(3) The downloaded file has 5% of data in a different order than the original file.
(4) The downloaded file has the data in exactly the same order as the original file.
(5) FTP protocol cannot run on a network connection with errors.

30. Which of the following relations is in the 3rd normal form?
(1) student(studentIndexNo, name, parentName)
(2) sport(sportId, sportName, teacherName, teacherId)
(3) teacher(teacherId, teacherName, telephoneNumber, subjectName, subjectId)
(4) book(ISBN, title)
(5) patient(patientId, patientName, ward, wardId)

[*See page five*

- Consider the following three tables in a relational database to answer questions **31** to **34**. Assume that a subject has only one paper for an examination.

subject

subjectId	title
SUB001	Information and Technology
SUB002	Chemistry
SUB003	Physics

exam

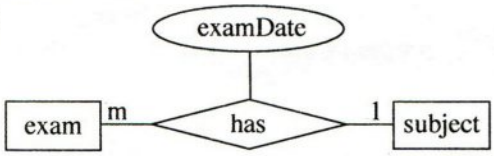
examId	name
EXAM001	GCE OL
EXAM002	GCE AL

examSubject

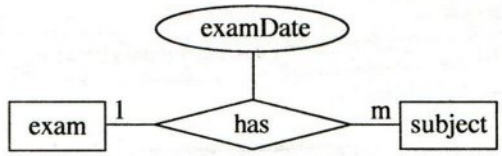
examId	subjectId	examDate
EXAM001	SUB001	2014.12.12
EXAM002	SUB001	2014.8.21
EXAM002	SUB002	2014.8.21
EXAM002	SUB003	2014.8.21

31 Which of the following is the most suitable Entity Relationship (ER) diagram to represent the above relational database tables?

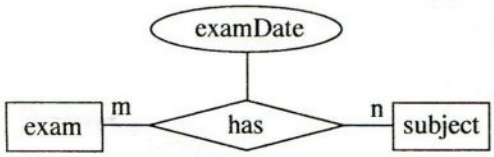
(1)



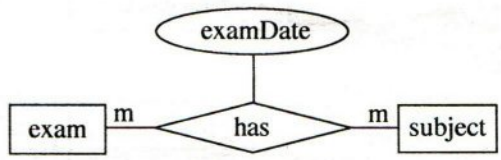
(2)



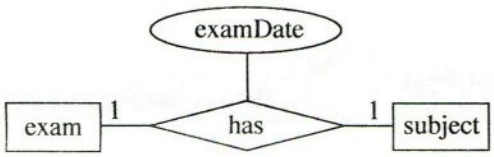
(3)



(4)



(5)



32. Which of the following is the correct primary key for examSubject table?
(1) examId (2) examId, subjectId (3) examId, examDate
(4) subjectId, examDate (5) examId, subjectId, name

33. Which of the following is the correct SQL statement to retrieve examId, name, and examDate of all examinations?
(1) select examSubject.examId, name, examDate from exam, examSubject where exam.examId=examSubject.examId
(2) select examId, name, examDate from exam and examSubject where exam.examId=examSubject.examId
(3) select examId and name and examDate from exam and examSubject where exam.examId=examSubject.examId
(4) select * from exam and examSubject where exam.examId=examSubject.examId
(5) select * from exam, examSubject where exam.examId=examSubject.examId

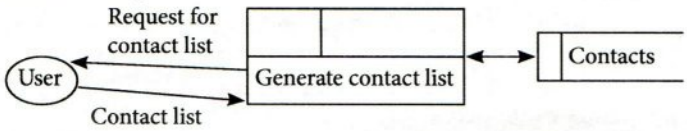
34. Which of the following SQL statements changes only the date of examination of Physics paper of GCE AL examination to 2014.08.25?
(1) update examSubject set examDate='2014.08.25' where subjectId='SUB003' or 'sub003'
(2) update examSubject set examDate='2014.08.25' where examId='EXAM002' or subjectId='SUB003'
(3) update examSubject set examDate='2014.08.25' where examId='EXAM002' and subjectId='SUB003'
(4) update examSubject set examDate='2014.08.25' where examDate='2014.08.21'
(5) update examSubject set examDate='2014.08.25' where examId='EXAM002' or subjectId='SUB003' or examDate='2014.08.23'

35. The Pilot, Phase, Direct, and Parallel are four different kind of system ..... strategies. Which of the following is most appropriate to fill the blank in the above statement?
(1) analysis (2) design (3) testing
(4) implementation (5) maintenance

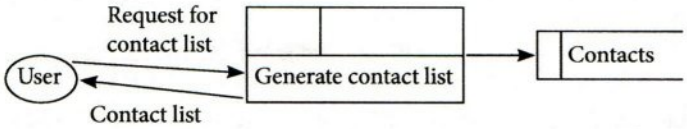
[*See page six*

36. Which of the following segment of a Data Flow Diagram best represents the process of getting the contact list of a mobile phone?

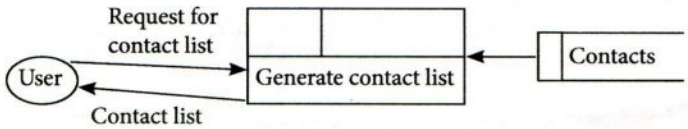
(1)



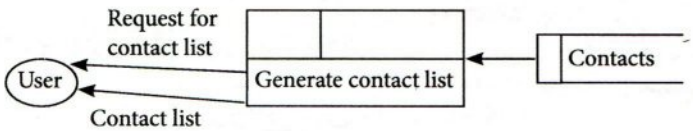
(2)



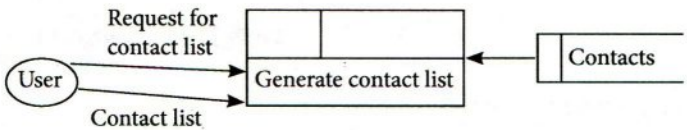
(3)



(4)



(5)



37 Which of the following is a syntactically correct Python function?

(1)
```
def isLarger(a,b):
    return a > b
```

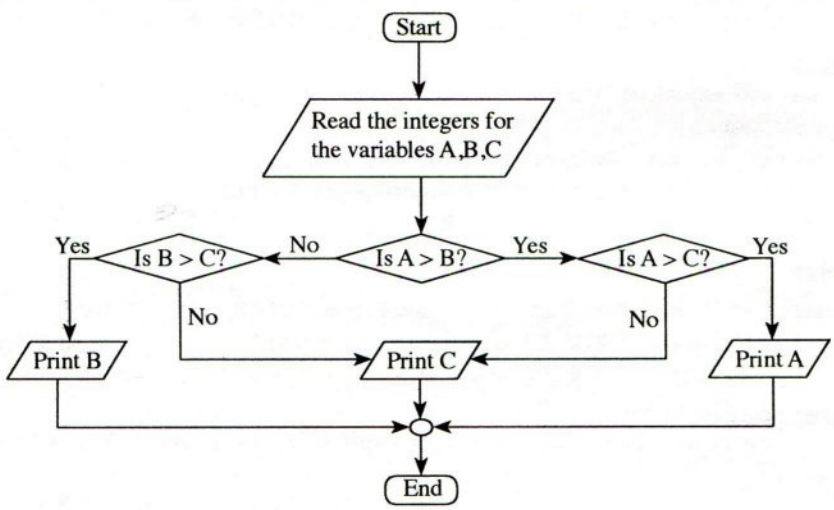
(2)
```
def isLarger(a,b):
    return a > b
```

(3)
```
def isLarger(a,b)
    return a > b
```

(4)
```
function isLarger(a,b):
    return a > b
```

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

- Use the following flowchart to answer questions **38** and **39**.



38. If a user input 20, 27, 18 for the variables, A, B, C respectively the output will be

(1) 18 (2) 20 (3) 27 (4) 20, 27 (5) 27, 18

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39. Which of the following Python programs correctly implements the above flowchart?

(1)
```
A = int(input("Enter a value for A."))
B = int(input("Enter a value for B:"))
C = int(input("Enter a value for C:"))
if (A > B):
    if(A > C):
        print(A)
else:
    if(B > C):
        print(B)
    else:
        print(C)
```

(2)
```
A = int(input("Enter a value for A."))
B = int(input("Enter a value for B:"))
C = int(input("Enter a value for C:"))
if (A > B):
    if(A > C):
        print(A)
    else:
        print(C)
else:
    if(B > C):
        print(B)
```

(3)
```
A = int(input("Enter a value for A."))
B = int(input("Enter a value for B:"))
C = int(input("Enter a value for C:"))
if (A > B):
    if(A > C):
        print(A)
    else:
        print(C)
else:
    if(B > C):
        print(B)
    else:
        print(C)
```

(4)
```
A = int(input("Enter a value for A."))
B = int(input("Enter a value for B:"))
C = int(input("Enter a value for C:"))
if (A > B):
    if(A > C):
        print(C)
    else:
        print(A)
else:
    if(B > C):
        print(C)
    else:
        print(B)
```

(5)
```
A = int(input("Enter a value for A."))
B = int(input("Enter a value for B:"))
C = int(input("Enter a value for C:"))
if (A > B):
    if(A > C):
        print(A)
    else:
        print(C)
else:
    if(B > C):
        print(C)
    else:
        print(B)
```

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

```
a = ['a', 2, [3, 'b', 4], [6, "abc", 9], 8]
print(a[2][2])
```

(1) 2 (2) [3, 'b', 4] (3) 'b' (4) 4 (5) 22

41 What is the value of variable z after executing the Python statement z = 1 = = 2?

(1) 0 (2) 1 (3) True (4) False (5) Null

42. Which of the following Python expressions shows the correct evaluation order of the Python expression 10 4 * 3/2 5?

(1) (((10 4) * 3)/2) 5 (2) ((10 (4 * 3))/2) 5 (3) 10 (4 * ((3/2) 5))
(4) 10 ((4 * (3/2)) 5) (5) (10 ((4 * 3)/2)) 5

43. Consider the following statements on Static Random Access Memory (SRAM):

A SRAM needs periodic refreshing
B It is used for Cache memory
C Registers are made of SRAMs

Which of the above statement(s) is/are correct?

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

[*See page eight*

44. Consider the following HTML style rules:

A body {color: red;}
B h1 {color: red;}
C p {color· red;}
h1 {color: red;}
D p, h1 {color· red;}

Which of the above rules will display h1 elements and all the paragraphs of the following document in red?

```
<body>
    <h1>Trees</h1>
    <p>Coconut tree</p>
    <p>Rubber tree</p>
    <h1>Flowers</h1>
    <h2>Rose</h2>
</body>
```

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

45. Which of the following systems should always be based on Artificial Intelligence?

A Expert Systems
B Enterprise Resource Planning (ERP) Systems
C Multi-Agent Systems
D Geographical Information Systems

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

46. Consider the following statements about an automated system:

A Human intervention is not required or minimally required.
B All the operations of the machine are controlled by the micro chip installed in the machine.
C A system that processes daily banking transactions can be considered as an automated system.

Which of the above statement(s) is/are correct?

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

47 Consider the following statements regarding the requirements of a Bank ATM:

A A customer shall be able to inquire his/her bank balance.
B A customer should be able to deposit money through ATM.
C Maximum withdrawal amount per day is Rs. 20,000.

Which of the above requirements is/are functional requirement(s) of the ATM?

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

48. Consider the following systems:

A Human blood circulatory system
B Human digestive system
C Human nervous system

The system(s) that can be considered as open system(s) is/are

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

49. Consider the following statements about Software Agents:

A A software agent is capable of autonomous actions in order to meet its design objectives.
B A software agent is capable of user-directed actions in order to meet users' objectives.
C A multi-agent system is composed of set of interacting agents.

Which of the above statements is/are true?

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

50. Consider the following statements about syntax or semantic errors in Python programming language:

A A program with syntax errors will not run to the end of the program.
B A program with only semantic errors will not run to its end.
C Syntax errors in programs are also called logical errors.
D Programs with semantic errors may not produce correct outputs for some inputs.

Which of the following statements is correct?

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

* * *

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2014 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2014 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2014

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 paper consists of* **08** *pages.*
- *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 2 - 6)

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 7 - 8)

- *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**
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 four** questions on this **paper itself***

Do not write in this column

1 (a) Consider the definition list given below rendered by a web browser:

CPU
    Central Processing Unit
ROM
    Read Only Memory

Complete the following HTML code segment to display the above list.

```
<dl>
    <.....>CPU<.....>
    <.....>Central Processing Unit<.....>
    <.....>ROM<.....>
    <.....>Read Only Memory<.....>
</dl>
```

(b) Write the outputs of the following HTML code segments when rendered by a web browser.

(i) `<abc>Greetings!</abc>`

.....

(ii) `</u>Greetings!<u>`

.....

(c) Consider the following output with check boxes rendered by a web browser:

Programming Languages Used:

C ☐ Java ☐ Python ☐

Complete the following HTML code segment to render the above output.

```
<form method = "get" action ="">
    .....
    .....
    .....
    .....
</form>
```

[see page three

Do not write in this column.

3. You are given the following two tables in a relational database.

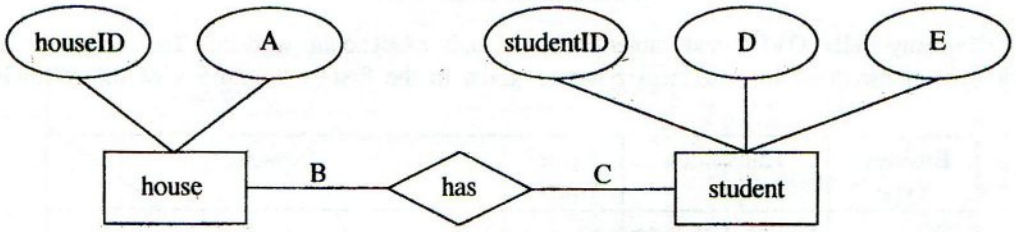
house

houseID	name
HS1	Gamunu
HS2	Tissa
HS3	Wijaya
HS4	Parakum

student

studentID	name	grade	houseID
STU001	Ranjith	13	HS1
STU002	Gopy	12	HS1
STU003	Vipula	12	HS2
STU004	Hakeem	11	HS3

(a) The above tables were created by converting the ER diagram given below.



Fill in the following blanks with the suitable labels or necessary information for the A, B, C, D and E shown in the ER diagram.

A - .....

B - .....

C - .....

D - .....

E .....

(b) State whether the relationship between the tables student and house, is one-to-one, one-to-many, or many-to-many. Justify your answer using suitable data from the above tables.

[see page five

Do not write in this column

(c) Write the output of the following SQL statements based on the above tables, if any, otherwise state the error.

(i) select * from student where houseID = 'HS3'

(ii) select studentID, houseID, name from student, house

4. (a) The memory of a computer system is byte addressable and has a maximum usable size of 4GB. What is the minimum width of its address bus in bits? Show all your workings clearly.

(b) Consider the following statement regarding operating systems:

"Process is another name for a program"

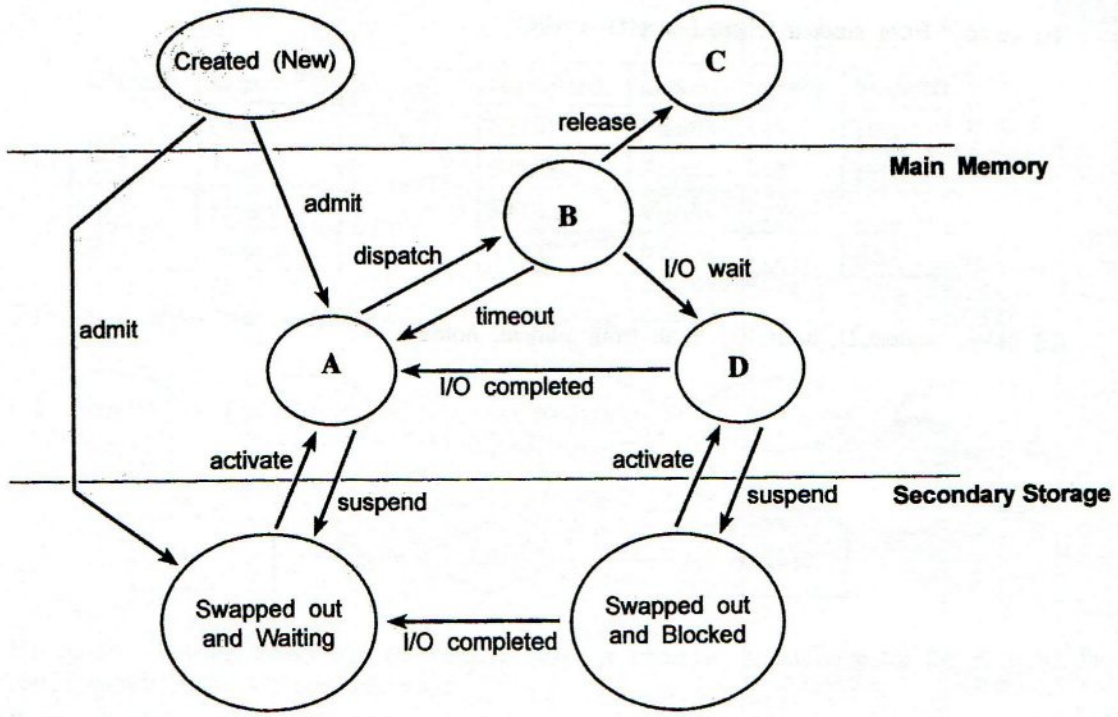
Do you agree with this statement? (yes/no) Give a reason.

[see page six

Do not write in this column

(c) Consider the following process state transition diagram in an operating system:

Process State Transition Diagram



Fill in the blanks in the table given below by providing most suitable terms for the labels A, B, C and D.

Label	Term
A	
B	
C	
D	

* *

[see page seven

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கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2014 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2014

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

20 E II

Part B

✱ *Answer any* ***four*** *questions only.*

1 An alarm system has been designed to detect break-ins by using three detectors. They are a motion detector, a glass break detector and a blackout detector. A detector can either be active (sends the logical value 1) or inactive (sends the logical value 0).
The system automatically detects a break-in and triggers the alarm (sends the logical value 1) only when all the three detectors are simultaneously active, or the blackout detector and anyone of the remaining detectors are active.

(a) Construct a truth table to represent the functionality of the above alarm system.

(b) (i) Derive the Boolean expression to represent the truth table constructed in section (a) above.

(ii) Simplify the Boolean expression obtained in section (b) (i) above, using Boolean algebra. Clearly show all the workings and Boolean algebraic rules used for this simplification.

(iii) Construct the logic circuit for the simplified Boolean expression obtained in section (b) (ii) above.

(c) The analysis of the past incidents where the alarm triggered reveals that break-in attempts have been made only during blackouts. Do you agree with the above statement? Justify your answer.

2. (a) Draw a diagram depicting the seven layers of the OSI reference model.

(b) You have received an email supposedly from the administrator of your email system notifying that your email account is about to be closed soon. It requests you to click on a link in the email and enter your current user name and the password if you want to continue using your email account. What is the main threat to the security if you agree with this request?

(c) Draw diagrams to depict the following LAN topologies.
(i) Bus
(ii) Star
(iii) Ring

(d) A new tool MRTT was used to measure the round trip time for data packets on the Internet between two machines. One machine is at the location X and the other one is at Y The MRTT reported a round trip time between X and Y as 8 ms. The straight-line-distance between point X and point Y is 3 000 km and the maximum speed of light is 300 000 km/s. Based on the above information, can this tool MRTT be relied upon? Justify your answer.

3. Consider the following employee evaluation process of a software development company to answer the questions given below

A software development company has 600 employees. The company manually evaluates each employee's performance at the end of each year. These performance results are used to decide employees' salary increments for the next year. In this process, each employee is evaluated based on several performance indicators listed in an evaluation form and marks for these indicators are given by his/her superiors. The evaluation process consumes significant amount of each employee's working time. Once the marks are gathered, Human Resource (HR) manager takes around two months to compile them to prepare a report. A committee comprises of two executives from the HR department and an expert from the Finance department are appointed to decide the salary increments of each employee. This committee makes their decision based on the HR manager's report and the special report given by the finance expert in this committee. The finance expert uses his experiences of the past evaluation process in addition to the organizational guidelines to prepare his special report. This

[see page eight

finance expert usually takes around three months to make his recommendations to the committee. This process delays the salary increments of the employees and makes them unhappy. The employees have requested the management to expedite this process and give them the increment in-time.

The company has decided to computerize this year-end employee evaluation process as an online system. The proposed system functions as follows: Only during the evaluation period, employees are allowed to login to the online evaluation system. Each employee is required to logged into the system and select a subordinate to evaluate. Then the system requests to provide marks in the evaluation form of the selected employee and submit it. At the end of the evaluation period, the system automatically compiles the data, generates a report and forwards it to the appointed committee.

(a) State **two** key reasons, that make the company to introduce online computerized system.

(b) Company thinks that an Artificial Intelligence based system would reduce the time taken to this process. Do you agree? Justify your answer.

(c) Do you consider the service provided by the company through this system to its employee as B2E? Justify your answer.

(d) Company decides to invite an outside expert to the committee. State one negative impact of this decision.

4. (a) Explain what is done by the Python interpreter when executing the following statements. You should state the types of the variables involved.

(i) `x = input("Enter a number")`

(ii) `infile = open("myfile.txt","r")`

(iii) `a = "a,b,c".split(",")`

(b) Factorial of a positive integer n is defined as $n \times (n-1) \times (n-2) \times ..... \times 3 \times 2 \times 1$.

(i) Propose an algorithm by using a flowchart to print the factorial of a given positive integer n.

(ii) Write a Python function to implement your flowchart.

5. Draw an Entity Relationship (ER) diagram to represent the scenario given below. In your diagram the attributes and the primary keys should be clearly indicated. Clearly state your assumptions, if any.

The EST University has three faculties: Education, Science, and Information Technology. Each faculty can offer one or more degree programs. The Faculty of Education and the Faculty of Science offer Bachelor of Education and Bachelor of Science degree programs respectively. However, the Faculty of Information Technology offers two degree programs: Bachelor of Science in Information Technology and Bachelor of Science in Software Engineering. At the time of the registration, students should pay the full degree program fee which may differ from one degree program to another. A student can enrol in only one degree program at a time. A degree program has two types of course units: compulsory and optional. A course unit can be available in more than one degree program. EST university has many lecturers. A lecturer can be assigned to one or more course units. A course unit can be assigned to one or more lecturers. Number of hours allocated for a course unit is distributed among the assigned lecturers when more than one lecturer is assigned to a course unit. Each faculty, degree program, course unit, lecturer, and student are uniquely identified by 'facultyID', 'degreeID', 'courseID', 'lecturerID' and 'studentID' respectively.

6. A university in Sri Lanka has around 8 000 students. It has only one library. Currently, three library assistants provide all the library services such as lending, returns and answering the queries from the students. It is observed that about 90% of the students use the library facilities from 7:00 a.m. to 9:00 a.m., 12 noon to 1:00 p.m. and 6:00 p.m. to 7:00 p.m. Long queues of students can be seen in front of the three counters manned by the three library assistants during those hours. This situation has led to students' unrest since they have to waste their time in long queues. Library assistants are also not happy due to heavy work load and sometimes this has lead them to make mistakes.

(a) Identify and state **three** functional requirements associated with the above university library system.

(b) Identify and state **two** non-functional requirements related to the above system with justifications.

(c) Propose **two** different computerized solutions and **one** non computer-based solution to solve the problems in the university library system.

* * *

20 - Information & Communication Technology

Distribution of marks

Paper I

Time Duration 02 hours

Questions 50

Total Marks 50X2 = 100

Paper II

Time Duration 03 hours

Part A - Structured Questions

04X10 = 40

Part B - Essay Questions

15X04 = 60

Paper II Total marks = 40+60 =100

Final marks = $\frac{Paper\ I + Paper\ II}{2}$

$= \frac{100+100}{2}$ =100

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ජාතික අගයීම් හා පරීක්ෂණ සේවාව

இலங்கைப் பரீட்சைத் திணைக்களம்
தேசிய மதிப்பீட்டிற்கும் பரீட்சித்தலுக்குமான சேவை

අ.පො.ස.(උ.පෙළ) විභාගය - 2014
க.பொ.த (உயர் தர)ப் பரீட்சை - 2014

විෂයය අංකය / பாட இலக்கம் } 20 විෂයය / பாடம் } Information & Communication Technology

ලකුණු දීමේ පටිපාටිය/புள்ளி வழங்கும் திட்டம் - I පත්‍රය/பத்திரம் I

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

විශේෂ උපදෙස් / விசேட அறிவுறுத்தல் } එක් පිළිතුරකට ඒකක / ஒரு சரியான விடைக்கு ලකුණු / புள்ளி (2) බැගින් 50 / புள்ள வீதம்

මුළු ලකුණු / மொத்தப் புள்ளிகள் 02×50 = **100**

PART II

Question Number	Expected Answer	Allocation of marks
	Part A : Structured	
1(a)	<dl> <dt>CPU</dt> <dd>Central Processing Unit</dd> <dt>ROM</dt> <dd>Read Only Memory</dd> </dl> • **At least one pair of <dt> and </dt> · 1 mark** • **At least one pair of <dd> and </dd> : 1 mark** • **Complete answer : 1 mark**	Total 3
1(b) (i) 1(b) (ii)	Greetings! Greetings! **Marks:** **1 mark for each Greeting!**	Total 2
1(c)	Programming Languages Used: or <hN> Programming Languages Used:</hN> N = 2,3 or (N≠1) Programming Languages Used: or Programming Languages Used: or Programming Languages Used: surrounded by invalid HTML tags or valid tags with incorrect order **Marks:** **Any of the above: programming languages used : 1 mark** **No marks for answers without colon (:).**	Total 1
	C <input type="checkbox" .... .> Java <input type="checkbox" .. ..> Python<input type="checkbox" .. .> **Each line start with a text, input tag and the attribute "checkbox" : 1 mark (maximum 3 marks)** **complete answer with strict syntax (which displays the given output as appeared in the paper) : 1 mark**	Total 4

2(a)	One's complement of 0001 is 1110 (**1 mark**) 1110 + 1(**1 mark**) = 1111 (**1 mark; Equal sign is essential**) or number of bits = 4 (**1 mark**) Getting 2^4 (**1 mark**) $(2^4 - 1)_{10} = 1111_2$ (**1 mark; Equal sign is essential**) or Reverse Order is accepted	Total 3
2(b)	C2C Agree? **No** (**1 mark**) Reason: The transaction is between the ABC Company and a consumer or definition of C2C (**1 mark**) B2C Agree? **YES** (**1 mark**) Reason: The transaction is between the ABC Company and a consumer or definition of B2C(**1 mark**)	Total 4
2(c)	B Software Agent (**1 mark**) A/C Company Web Site/ Consumer (**1 mark each**)	Total 3
3(a)	A. name (**1 mark**) B. 1 and C: m (**1 mark**) or n or * D: name or grade (**1 mark**) E. grade or name (**1 mark**)	Total 4
3(b)	One-to-many / m:1 / many to one (**1 mark**) [1:m no marks] *:1 One student belongs to one house (any row from the student table) (**1 mark**) One house can have more than one students (First two rows in the student table) (**1 mark**)	Total 3
3(c)(i)	studentID name grade houseID STU004 Hakeem 11 HS3 The answer similar to the above two rows: **2 marks (NO INFORMATION LOSS)** Spelling mistakes/additional spaces/case changes **DEDUCT 1 mark**	Total 2
3(c)(ii)	Error Attribute name and houseID (one is enough) appear in both tables. (**1 mark**)	Total 1

A- ④

4(a)	Maximum usable size of memory = 4GB = 2^{32} bytes (**1 mark**) Maximum Number of different addresses required = 2^{32} (**1 mark**) Number of minimum bits required for an address = 32 bits Answer: Therefore width of the address bus = 32 bits. (**1 mark**)	Total 3
4(b)	NO (**1 mark**) Process is a program in execution (not just an alternative name for a program). (**2 mark**)	Total 3
4(c)	A. Ready (**1 mark**) B: Running (**1 mark**) C: Terminated (**1 mark**) D: Blocked (**1 mark**)	Total 4

PART B: Essay

B- ①

1(a)	Motion detector: A Glass break detector: B Blackout detector: C Alarm/output: Q (**If not defined, deduct 1 mark from the total marks**)	Total 4

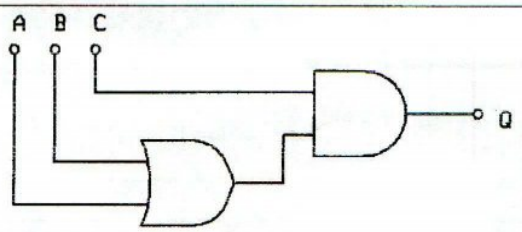
A	B	C	Q
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

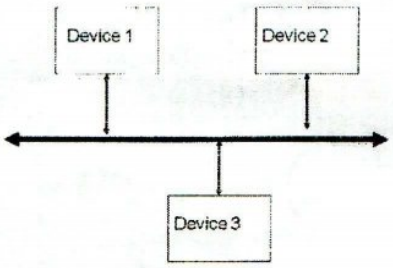
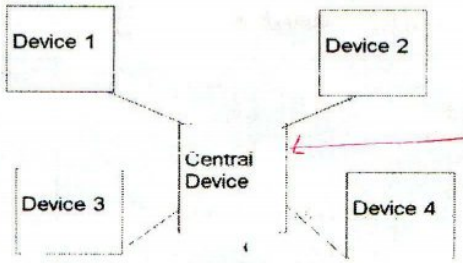
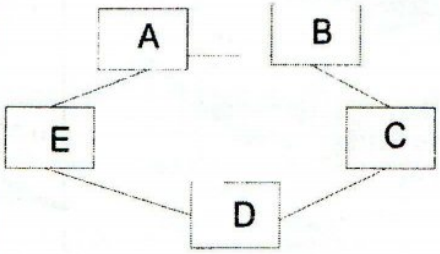
Each correct row with Q=1 will get **1 mark**. (Maximum **3 marks**)

Correct table: **1 mark**

Note: ***Marks should be given only when the given names for detectors or well defined symbols for detectors are used***. No marks will be given for other cases.

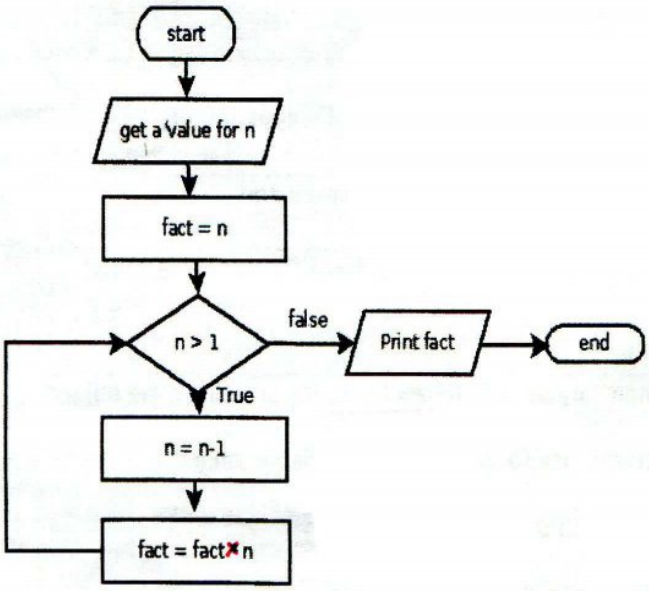
Q = ABC + C(A+B) (According to Scenario)

1(b)(i)	Q = $\overline{A}$.B.C + A.$\overline{B}$.C + A.B.C (**2 mark**) if the process is correct ONLY. Q = C.(B+A) Q = $\overline{x}yz + x\overline{y}z + xyz$	Total 2
1(b)(ii)	= B.C.(A'+A) + A.B'.C ***or*** =B.C.(A'+A) + A.B'.C + A.B.C if A + A = A is given **(1 mark)** = B.C + A.$\overline{B}$.C ($\overline{A}$ + A = 1) = C.(B + A.$\overline{B}$') = C.(B + A) (B+ A.$\overline{B}$ = B + A) or B.(A+C) = B.A+B.C If C.(B+A) is obtained correctly as the final answer, give **1 mark** For ***two relevant rules*** depending on the approach: **1 mark** each	Total 4
1(b)(iii)	 **2 or 0 marks** [Only If three marks collect above II]	Total 2
1(c)	Yes. (**1 mark**) Answer should include the following facts: 1 Break-ins are indicated by alarm triggers. 2. If Alarm is to be triggered, blackout detector (c) must always be active. **(2 marks)**	Total 3
2(a)	Application Presentation Session Transport Network Data Link Physical **(Either 0 or 3 marks)**	Total 3

2(b)	1 This is an example for a potential attack (phishing). 2. The sender of the email can be easily faked and therefore should not be trusted. When the answer is either 1 or 2 above, give **2 marks**. or The attacker **can collect the user names and the passwords of the email users (2 marks)** who comply with this request and **their accounts can be used by the attacker (1 mark)** to **launch further attacks (2 marks)**.	Total 5
2(c)(i)		Total 1
2(c)(ii)		Total 1
2(c)(iii)		Total 1
2(d)	No.**(1 mark)** Light takes 10 ms =3000Km / 300000Km per Sec * 1000ms (calculation **1 mark**) to travel from X to Y Therefore it is impossible to get an RTT less than 20ms (10ms * 2) **(2 marks)**.	Total 4

B-(3)

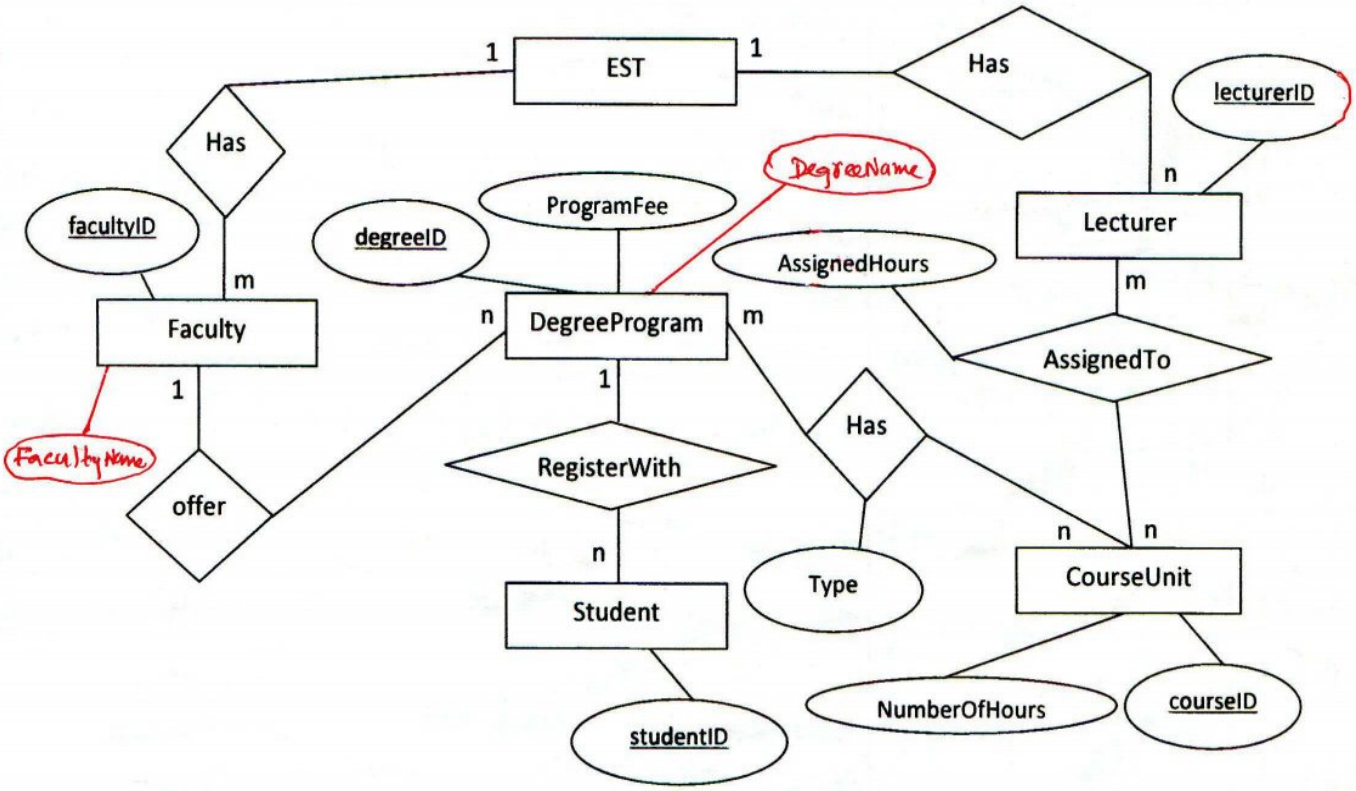
3(a)	The manual process: • **Consumes significant amount** of each employee's **working time.** **(2 marks)** • **Delays the salary increments** of the employees and make them unhappy **(2 marks)**	Total 4
3(b)	Agree. **(1 mark)** To ***reduce the time taken by the Finance expert*** **(2 marks)** to prepare the special report, we can introduce an Artificial intelligence based system to ***replace/assist the Finance expert.*** (2 **mark)** Suggested AI application is ***Expert System*** or ***Agent System.*** Software Agent	Total 5
3(c)	Yes. **(1 mark)** The employees have requested the management to expedite this process and give them the increment in-time. So the company has catered to the request by introducing online evaluation process. Therefore, ***it is a service given by the company to its employees in an online mode.*** **(2 marks)** Therefore it is B2E.	Total 3
3(d)	Damage the employee privacy or Abusing company strategic information by a competitor or Any other negative impact	Total 3
4(a)(i)	Print the string "Enter a number" on the screen and Wait till user input. Assign the user input to the variable x. (**1mark** for all three steps) Type of x is string. **(1mark)**	Total 2
4(a)(ii)	Open a file named "myfile.txt" to read data (by creating a file object) Assign the file (reference to object) to the variable infile. (**1 mark** for the two steps above) The infile variable type file (object). **(1 marks)**	Total 2

4(a)(iii)	Split the string "a,b,c" by the character "," and Assign the output to the variable a. **(1 mark for the two steps above)** Type is an array/list **(1 mark)**	Total 2
4(b)(i)	 Marks any flow charts	Total 5

	Start and End **(1 mark)** Correct decision making symbol **(1 mark)** with the correct decision Correct output **(1 mark)** For the correct logic **(2 marks)** ***Variation: the given number can be kept in a variable.*** ***Note: Any variations contact Controllers.***	

4(b)(ii)	def fact():
	n = int(input("Enter a number "))
	fact = n
	while (n > 1)
	n = n-1
	fact = fact * n
	print(fact)
	
	Correct function definition: **1 mark**
	Correct repetition: **1 mark**
	Correct output: **1 mark**
	Correct implementation of the flowchart: **1 mark**
		Total 4

5	Refer ER diagram. Each entity with its primary key – **1 mark (5 marks)** Each relationship with correct cardinality and attributes– **1 mark (6 marks)** Each attribute except primary key– **1 mark (4 marks)** Entities and primary keys: Faculty – facultyID Lecturer – lecturerID DegreeProgram – degreeID CourseUnit – courseID Student -studentID Different names are allowed if the correct scenario can be obtained from the ER diagram.	Total 15



4 attributes should be:

DegreeName

FacultyName

ProgramFee

NumberOfHours

OR

Any other relevant attributes with assumptions

(StudentName, Address, LectureName, DOB, ContactNo, ...)

6(a)	Requirement 1 A student **shall** be able to borrow a book or The library Assistants **shall** be able to lend a book OR Shall be able **to facilitate** lending a book (without actor) Requirement 2: A student **shall** be able to return a borrowed book or The library assistants **shall** be able to accept returned books. OR Shall be able **to facilitate** book returns (without actor) Requirement 3: The library assistants **shall / should** be able to answer student queries. (***IEEE standard*** – **2 marks each**) (Missing actor deduct **1 mark**)	Total 6
6(b)	Efficiency (**1 mark**) ***Reason:*** heavy work load or any other reason from the scenario which negatively affects on the efficiency (**1 mark**). Accuracy(**1 mark**) ***Reason:*** Mistakes or any other reason from the scenario which negatively affects on the accuracy (**1 mark**).	Total 4
6(c)	Computerized solutions: for functional requirement Use of Bar code readers, RFID, e-books, on-line services, on-line FAQs, etc. (**1 mark** each up to **2 marks**) Non computer based solutions: Increase the number of counters and library assistants, Any other acceptable solution without using electronic devices. (**3 marks**) Radio Frequency Identification Device ← RFID	Total 5