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 = \[
\frac{Paper I + Paper II}{2}
\]

\[
= \frac{100 + 100}{2} = 100
\]
### කළිගූ විශේෂ විශේෂාකාරකම්

ජාතීන් ප්‍රවර්තනාව මගේ පිළිස්තා 120 අමතරකම්

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2 අමතරකම් නීතිය 50 අමතරකම් නීතිය

02 අමතරකම් 50 අමතරකම් 100
## Part A: Structured

### 1(a)

```xml
<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

### 1(b) (i)

Greetings!

### 1(b) (ii)

Greetings!

**Marks:**

1 mark for each Greeting!

### 1(c)

- Programming Languages Used: `<p>` or `<h1>` Programming Languages Used: `<h1>`
  - Programming Languages Used: `<b>` Programming Languages Used: `<b>` "by" or
  - Programming Languages Used: `<br>` or

Programming Languages Used: surrounded by invalid HTML tags or valid tags with incorrect order `<br>`

**Marks:**

- Any of the above: programming languages used: 1 mark
- No marks for answers without colon (`:`).

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

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20 - I.C.T (Marking Scheme) Amendments to be included
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

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)

2(c) B Software Agent (1 mark)

A/C Company Web Site/ Consumer (1 mark each)

3(a) A. name (1 mark)

B. 1 and C: m (1 mark) 

D: name or grade (1 mark)

E. grade or name (1 mark)

3(b) One-to-many / m:1/ many to one (1 mark) [1 mark]

One student belongs to one house (any row from the student table) (1 mark)

One house can have more than one student (First two rows in the student table) (1 mark)

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

3(c)(ii) Error

Attribute name and houseID (one is enough) appear in both tables. (1 mark)
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)

4(b) NO (1 mark)
Process is a program in execution (not just an alternative name for a program). (2 mark)

4(c) A. Ready (1 mark)
B: Running (1 mark)
C: Terminated (1 mark)
D: Blocked (1 mark)

PART B: Essay

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)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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</tbody>
</table>

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.

Total 4
\[ Q = ABC + C(A + B) \quad \text{(According to Scenario)} \]

<table>
<thead>
<tr>
<th>1(b)(i)</th>
<th>( Q = \overline{A} \cdot B \cdot C + A \cdot B \cdot C + A \cdot B \cdot C ) (2 mark) if the process is correct ONLY. ( Q = C \cdot (\overline{B} + A) ) ( Q = \overline{x_2} + x_2 x_2 + x_2 )</th>
<th>Total 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(b)(ii)</td>
<td>( Q = B \cdot C(A' + A) + A \cdot B \cdot C ) or ( Q = B \cdot C(A' + A) + A \cdot B \cdot C + A \cdot B \cdot C ) if ( A + A = A ) is given (1 mark) ( Q = B \cdot C + A \cdot B \cdot C ) (( \overline{A} + A = 1 )) ( Q = C \cdot (B + A \cdot \overline{B}) ) ( Q = C \cdot (B + A) ) (( B + A \cdot \overline{B} = B + A )) or ( B \cdot (A + C) = B \cdot A + B \cdot C )</td>
<td>Total 4</td>
</tr>
</tbody>
</table>

If \( C \cdot (B + A) \) is obtained correctly as the final answer, give 1 mark

For two relevant rules depending on the approach: 1 mark each

<table>
<thead>
<tr>
<th>1(b)(iii)</th>
<th>[Only If three marks, collect mark II]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or 0 marks</td>
<td>2 or 0 marks [Only If three marks, collect mark II]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1(c)</th>
<th>Yes. (1 mark)</th>
</tr>
</thead>
</table>

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)

<table>
<thead>
<tr>
<th>2(a)</th>
<th>Application</th>
<th>Presentation</th>
<th>Session</th>
<th>Transport</th>
<th>Network</th>
<th>Data Link</th>
<th>Physical</th>
</tr>
</thead>
</table>

( Either 0 or 3 marks)
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).

<table>
<thead>
<tr>
<th>2(c)(i)</th>
<th>Total 1</th>
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<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
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</table>

<table>
<thead>
<tr>
<th>2(c)(ii)</th>
<th>Total 1</th>
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<tbody>
<tr>
<td><img src="image2" alt="Diagram" /></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>2(c)(iii)</th>
<th>Total 1</th>
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<tbody>
<tr>
<td><img src="image3" alt="Diagram" /></td>
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<thead>
<tr>
<th>2(d)</th>
<th>Total 4</th>
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</thead>
</table>
| No. (1 mark)  
Light takes $10 \text{ ms} = 3000 \text{Km} / 3000000 \text{Km per Sec} \times 1000 \text{ms}$  
(calculation 1 mark) to travel from X to Y  
Therefore it is impossible to get an RTT less than 20ms ($10 \text{ms} \times 2$) (2 marks). |

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20 - I.C.T (Marking Scheme) Amendments to be included
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)

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.

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.

3(d) Damage the employee privacy or
Abusing company strategic information by a competitor or
Any other negative impact

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. (1 mark for all three steps)
Type of x is string. (1 mark)

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 mark)
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)

4(b)(i)

start
get a value for n
fact = n

\[ n > 1 \]

\[ n = n - 1 \]

\[ fact = fact \times n \]

Print fact
end
Start and End (1 mark)  
Correct decision making symbol (1 mark)  
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.
4 attributes should be:
DegreeName
FacultyName
ProgramFee
NumberOfHours
OR
Any other relevant attributes with assumptions
(StudentName, Address, LectureName, DOB, ContactNo, ...)

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20 - I.C.T (Marking Scheme) Amendments to be included
| Requirement 1 | A student **shall** be able to borrow a book or  
The library assistants **shall** be able to lend a book  
**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.  
**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)** |  |

<table>
<thead>
<tr>
<th>Efficiency (1 mark)</th>
<th><strong>Reason:</strong> heavy work load or any other reason from the scenario which negatively affects the efficiency (1 mark).</th>
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<tbody>
<tr>
<td>Accuracy (1 mark)</td>
<td><strong>Reason:</strong> Mistakes or any other reason from the scenario which negatively affects the accuracy (1 mark).</td>
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</table>

| 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**