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மத்திய மாகாண கல்வித் திணைக்களம்
DEPARTMENT OF EDUCATION - CENTRAL PROVINCE

G.C.E.(A/L) Practice Test- 2026

Information & Communication technology	20	E	II	Grade 13	3 Hours

Important:

Additional Reading Time – 10 minutes

- *This question paper consists of five pages.*
- *This question paper comprises of two parts, **Part A** and **Part B**. The time allotted for **both parts** is **three hours**.*

Part A (Structured Essay)
(pages 1-4)

- *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 5-7)

- *This part contains **six** questions, of which, **four** are to be answered. Use the paper 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** this question paper from the examination hall.*

Part A - Structured Essay

*Answer **all four questions** on this paper itself.*

1. Hasitha has created a database for his company using MySQL.

(i) Using figure 1.1 given below write the SQL statement used to create the table **employee.**

```
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| EmployeeId | char(4)     | NO   | PRI | NULL    |       |
| FullName   | varchar(50) | YES  |     | NULL    |       |
| DOB        | date        | YES  |     | NULL    |       |
| salary     | int         | YES  |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
4 rows in set (0.02 sec)
```

Figure 1.1

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(ii) Write down the SQL statement required to insert the following data of EmployeeId E001 to the **employee** table.
E001, Saman Perera, 1978-02-12, 20000

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(iii) Hasitha has used HTML and PHP to create his company web site. Figure 1.2 displays code segment is related to viewing full name and salary of all employees in the company. Use the list below to complete the missing parts of the code. **Write the number of each replacement you have selected in the given box in figure 1.2.**

```
<html><body>

<?php
$conn = new mysqli( [ ] 'hasitha', 'EWQ897#0', 'powerteam');
if ($conn->connect_error) {
  die("Connection failed: ". $conn->connect_error);
}
$sql = [ ] ;

$result = $conn->query($sql);
if ($result->num_rows > 0) {
  echo "<table><tr><th> Full Name</th><th>salary</th></tr>";
  // output data of each row
  while($row = $result->[ ]) {

echo "<tr><td>".$row["FullName"]."</td><td>".$row["salary"].</td>
</tr>";
  }
  [ ] "</table>";
} else {echo "0 results";
}
$conn->[ ];
?> </body></html>
```

Figure 1.2

List: 1. close()	2. 	3.echo	4.'admin'	5.'localhost'
6."SELECT FullName, salary FROM employee"				7. fetch_assoc()
8."SELECT FullName, salary FROM powerteam"				

See page three

2. Mayura needs to design a program to greet her class mates when entering the class room.

(i) Draw a flow chart to greet someone entering the class room based on the given time periods.

Good morning should be displayed from 0.00 a.m to 11.59 a.m.

Good afternoon should be displayed from 12.00 p,m to 3.00 p,m.

Good evening should be displayed from 3.01 p,m to 7.00 p.m

(ii) Write the python code for the algorithm you have written in (i).

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See page four

3. Memory management is a fundamental role of the operating system.

(i) Name two techniques used for effective memory management in computers.

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(ii) Briefly explain the difference between process control block (PCB) and process state transition diagram.

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(iii) Draw a process state transition diagram showing the following four states only: Ready, Running, Waiting, Terminated. Label all possible transitions between these states.

4. (i) Compare e-Commerce and e-Business with suitable examples.

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(ii) A small clothing boutique in Kandy is considering moving its business online. Give two advantages and two challenges the boutique might face when adopting e-Commerce.

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(iii) Suggest two security measures the boutique should implement to protect customer data and prevent online fraud.

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See page five

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Information & Communication technology | 20 | E | II

Part B

- *Answer any **four** questions only*

5. (a) Simplify the following Boolean expression using Boolean algebra. Show each step clearly.

$$F = A'B'C' + A'B'C + A'BC' + A'BC + AB'C'$$

(b) A chemical plant has three safety sensors: A high temperature sensor (P), a high-pressure sensor (Q) and a gas leak detect sensor(R). All the sensors state becomes 1 when they detect the particular properties. The alarm system must activate (F = 1) when any two of the three sensors are active.

(i) Draw the truth table for the output $F(P, Q, R)$.

(ii) Write the Boolean expression in sum-of-products (SOP) form directly from the truth table.

(iii)Simplify the expression you obtained in (ii) using a Karnaugh map.

(iv)Draw the logic circuit for the simplified expression using AND, OR, NOT gates only.

6. (a) Explain the difference between circuit switching and packet switching giving one advantage and one disadvantage of each.

(b) A company has 4 departments: Admin (50 hosts), Sales (120 hosts), Research & Development (30 hosts), Human Relations (20 hosts). IP 192.168.1.0/24 should be used to accommodate all departments with minimal waste.

(i) Show the subnet mask, network address and broadcast address for each department.

(ii) Explain what is a private IP address.

(c) Explain three key features of TCP.

(d) A school has 3 buildings, each with 10 computers. Design a **LAN** using a star topology. Identify necessary devices and cabling.

7. Read the following scenario and answer the given questions.

A public library wants to design a database to manage its daily operations. Each book in the library has a unique ISBN[ISBN], a title[title], a publication year[pubyear]. A book may be written by one or more authors. For each author, the library stores a unique author ID [auID] and name[name]. Each book is published by exactly one publisher. Publishers are identified by a unique publisher ID

See page six

[pubID] and have a name[pubName] and address[address]. The library may have multiple copies of the same book. Each copy is identified by a copy number[copynum] together with the book's ISBN. The status[status] of each copy is also recorded.

Each library member has a unique member ID[memID], full name[fullname], date of birth[DOB], phone number[pn], and membership date[memDate]. A member can borrow many books, but a specific physical copy of a book can be borrowed by only one member at a time. The library keeps track of loans. Each loan is identified by a loan ID [loanID]. For each loan, the system records the loan date[loanDate], due date[dueDate], and actual return date[actRDate]. A loan is associated with exactly one member and exactly one book copy.

(i) Draw an ER diagram for the above scenario. It should use standard symbols and rules. Mention if you make any assumptions. Use only the terms given within square brackets for the attributes.

8. TravelEasy is a popular website where users can book flights, hotels, and rental cars. To improve customer experience, the company uses several software agents:
   - A search agent that scans airlines and hotel websites to find the best prices.
   - A negotiation agent that can bargain with hotel booking platforms on behalf of the user.
   - A recommendation agent that suggests destinations based on the user's past bookings and browsing history.

   (i) Define a software agent in the context of this web site.

   (ii) Identify three characteristics of a search agent.

   (iii) Briefly explain how above characteristics mentioned in (ii) is demonstrated using software agents in the given scenario.

   (iv) Suggest one security or trust issue that might arise with the negotiation agent.

9. A local government body (NUDA) plans to develop a "Building Permit Management System" to replace its current manual paper-based process. The system will allow citizens to apply for building permits online, track application status, and receive approvals digitally. NUDA staff will use the system to verify documents, conduct site inspections, and issue permits. NUDA staff use tablets to record data. The system must integrate with the existing e-Citizen portal and the National Identity Card (NIC) verification service. You are appointed as a system analyst. The project will follow SSADM.

   (i) List three functional requirements for this system.

   (ii) List three non-functional requirements for this system.

   (iii) Name three requirement gathering techniques that can be used here.

   (iv) Mention how each could be applied to this scenario.

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(v)A developer argues: *"If we satisfy all functional requirements, the system will be successful. Non-functional requirements are optional."* Critically evaluate this statement using the NUDA system as an example.

10. A tea estate in Nuwara Eliya wants to implement an IoT-based smart agriculture system to monitor soil moisture, temperature, humidity, and rainfall. The system should send alerts to the planter's mobile phone when conditions require action (e.g., irrigation needed).

(i) Draw a labelled block diagram showing the main components of this IoT system and how they interact.

(ii) Explain the data flow from the sensors to the planter's mobile phone, including the role of a cloud platform and communication protocols.

(iii) Give two challenges the estate owners would face when implementing this system in Nuwara Eliya.

(iii)For the smart agriculture system, write a Python function named check_irrigation(). It should take soil_moisture (integer percentage), temperature (float in °C), and rainfall_today (float in mm) as inputs. It should return "IRRIGATE" if either soil_moisture is below 40% and temperature is above 28°C, or rainfall_today is less than 5 mm and soil_moisture is below 50%.it should otherwise return "NO_IRRIGATION".

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