**A-level 2017 Paper 2**

* 1. The two groups are **office staff** and **teachers/** **non-office staff**.

This is because each group has **different set of requirements and will face different issues**. Non-office staff uses the swipe card to enter classrooms and laboratories only. In addition to the use of swipe card, office staff uses the software for controlling the system to set access rights, view unauthorised access and produce reports.

* 1. **Data flow diagram**











* 1. The team needs to check that **all project requirements are met** and **the design is feasible** (i.e.: within technical specifications and budget).

The first method is to **review the design with key stakeholders** so as to receive feedback on whether the requirements are met and to receive approval to proceed to the next phase. The members involved are project manager, user interface designer, database architect.

The second method is to **estimate the total cost based on the design** to determine if refinement is necessary before proceeding to the next phase. The members involved are project manager and external swipe card system expert.

* 1. White box testing uses knowledge of the internal structure of the software while black box testing ignores the internal logic of the software.

White box testing checks all pathways through the code while black box testing looks at what happens at the interface (i.e.: the output generated from given input).

White box testing is commonly used during unit testing while black box testing is commonly used during integration testing.

* 1. **Staff (end-user) section** will list the steps to use the swipe card system to open classrooms and laboratories.

**Office staff (end-user) section** will list the functions available, in the software for controlling the system, and the instructions for each of the functions (such as updating access right, generating reports).

**System administrator section** will include installation and updates that help a system administrator with product maintenance as well as troubleshooting when swipe card machine or software malfunctions.

OR **User instructions**, **maintenance** and **FAQ** sections?

* 1. Any two of the following:

**Preventive maintenance** is performed with the intent of avoiding problems/ break down/ failures. An example is to schedule regular updates on the antivirus software used for the software controlling the system.

**Corrective maintenance** is performed after hardware/ software has malfunction and requires repair. For example, one of the swipe card system can no longer read the swipe card and has to be replaced.

**Adaptive maintenance** is concerned with the change in the software that takes place to make the software adaptable to new environment such as to run the software on a new operating system. For example, the software for controlling the system has to be updated should the operating system of the school’s computers be changed (e.g. from Windows to MAC OS).

**Perfective maintenance** involves making functional enhancements to the system in addition to the activities to increase the system’s performance even when the changes have not been suggested by faults. An example is to expand the use of the swipe card system to record student attendance in classes.

* 1. The method is **role based authentication**. It sets access rights based on the roles of individual users so that only specific user(s) may perform a specific task.
  2. **Data integrity may be compromised**. Students may pass their swipe cards to their classmates and they will be recorded as present even though they are absent.

Implement finger print authentication instead.

* 1. Diagram A because it shows **data flow at one byte at a time** and each byte is accompanied by a **start and stop bit**.

Asynchronous transmission is relatively slow due to the **additional start and stop bits and gaps between bytes**.

* 1. A - router

B - switch

Router manages the IP addresses and acts as the gateway to the Internet.

Switch manages the MAC addresses of devices connected to the local area network.

* 1. A router is a networking device that forwards data packets between computer networks. It performs the traffic directing functions on the Internet.
  2. The advantage is the employee is not bounded by the geographical distance between her home and office.

The disadvantage is should the router be down, the employee will not be able to connect to the wide area network and transfer data to her office; hence, possibly missing the deadline.

1. An object is an instance of a class. It shares properties and behaviours with other objects belonging to the same class.



1. Inheritance allows **reusability** and thereby reducing the time needed for implementation.
2. The integer variable tracks the location of the most recently added element in the array.

The array stores the elements of a stack.

**Initialise** two stacks – one to store numbers, one to store operators.

**Traverse** the expression.

**Push** integers into number stack and push operators to operator stack.

If “)” is read, pop two numbers and **pop** one operator to form an expression and compute the expression. Push the result into number stack.

**Repeat until** operator stack is empty and **return** the integer left in the number stack.

1. Data is stored in the centralized server.

Data is stored in each node on the peer-to-peer network.

Client-server network is more secured as it contains a list of usernames and passwords for authentication.

Client-server network is more expensive to implement.

1. A **print server** connects the printer to **client computers** over a network. It **accepts print jobs** from the 20 computers and **sends the jobs to a queue** in the printer.
2. 30 megabytes = 240 megabits

240/5 = 48

The transfer rate is 48 Mbps.



1. S
2. ARRAY [1:9, 1:9] OF INTEGER



Puzzle [3,5] 4

This is because the grid is not linear. It is represented by rows and columns where each number in the grid may be located by a coordinate. Hence, a 2D array is more suitable.

1. DECLARE line: STRING

OPENFILE myFile.txt FOR WRITE

FOR row = 1 TO 9

FOR col = 1 TO 9

line line + ARRAY[row,col]

ENDFOR col

WRITEFILE myFile.txt, line

line “”

ENDFOR row

CLOSEFILE myFile.txt

1. The first debugging technique is **code tracing** where the flow of execution of the process is printed. Hence, the location where the error commences may be identified.

The second debugging technique is **condition handling** where handlers are programmed within the code to **catch exceptions**. For each type of error that occurs, the program will return a descriptive error message.

1. E-R diagram





1. A – EXIST (Exists in CUSTOMER table)

B – Float/ Double

C – RANGE (At least $150)

1. This is because it is not feasible to validate the full address. Instead, splitting the address into two fields, address and postal code, allows the database to look up a list of postal codes to validate the new address entered.
2. CustomerID in SALE and CUSTOMER table

CustomerName in CUSTOMER table

SalesPersonID in SALE and SALESPERSON table

SalesPersonName in SALESPERSON table

Integrity constraints are enforced on the whole relational database management system. Hence, the data is accurate and the calculation will be correct.

Relational database allows data sharing. Hence, applications can be developed to display the report in any required format.

dii)

1. data definition language (allowing the definition of the relational structure)

2. data manipulation language (allowing retrieval of data based on queries). For example: Select sum(amount) from Sales table where salesperson = ??