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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2019 FIRST SESSION

SUBJECT:	**Information Technology**
PAPER NUMBER:	I
DATE:	13th May 2019
TIME:	9:00 a.m. to 12:05 p.m.

Directions to candidates

A total of **SIX** questions must be attempted; **THREE** from Section A and another **THREE** from Section B.

SECTION A: INFORMATION SYSTEMS

Answer the first question in this section and any other TWO questions.

Question A1
This question is compulsory. Answer all parts.

a) Business intelligence has become a competitive edge for many businesses; not just those directly invested in the IT sector.
   i.   Outline **TWO** benefits that OLAP brings to a company. (2)
   ii. Briefly discuss **TWO** implementation issues of information systems in organisations. (2)

b) Data capturing forms the basis of many subsequent data analysis techniques.
   i.   Explain through the use of examples the term EDI. (1)
   ii. Outline **ONE** advantage apart from speed, which EDI brings to organisations. (1)
   iii. Outline the main stages in disaster planning and disaster recovery plan. (2)

c) Networking in organisations is essential to its daily operations.
   i.   Explain through the use of diagrams the common LAN topologies. (4)
   ii. Mention **ONE** use for the following protocols: HTTP, FTP. (2)

d) This part is on number base systems and number representation
   i.   Convert the decimal number 185 to hexadecimal. (1)
   ii. Add the following binary numbers: 11001010 and 11110011. (2)
   iii. Explain the 2's complement notation through the use of an example. (3)
                                                                    (Total: 20 marks)

Answer any TWO questions from A2, A3 and A4.

Question A2

a) Explain the need for ICT related training in organisations. (2)

b) What methods of training are available? Mention **ONE** advantage and **ONE** disadvantage associated with each method. (4)

c) One of the groups to be trained is made up of senior management.
   i.   What are the characteristics of such a group? (2)
   ii. What potential problems can be encountered when training this group? (2)

d) Project Management has been identified as an area in which the staff needs to be trained.
   i.   What are the aspects of project planning and scheduling that should be included during training? (3)
   ii. How do project reviews help in the management of a project? (2)
   iii. What qualities and characteristics are needed in the composition of a good project team? (5)

(Total: 20 marks)

Question A3
It is generally understood that the computer would be virtually unusable if it would have to access the hard-disk to retrieve all information needed to run the Operating Systems and the application programs.

a) Explain why the above statement is true. (2)

b) Why are both RAM and a hard-disk required in a computer system? (3)

c) A computer system was analyzed for problems and the conclusion was that the current storage subsystem is slowing down the system.
   i.   Suggest a device which can replace the hard-disk and solve the problem. (1)
   ii. Explain what benefits would the device recommended bring to the company. (2)
   iii. State **TWO** disadvantages of implementing the solution being recommended. (1)

d) The World Wide Web used ASCII as the character encoding system which was originally a 7bit encoding system.
   i.   What is the final bit in ASCII reserved for? (2)
   ii. ASCII has been superseded by a new system. What is the name of the new system? What were the limitations of ASCII? In which ways does the new system improve upon ASCII? (4)

e) A local manufacturing company would like to facilitate data entry from their manufacturing machines to the main terminal computer. They have eight manufacturing machines which store data on a local database. At the moment, management has to visit each machine at the workshop in order to extract the data from each machine and then collate it on a central computer. They would like to automate this process however they have made it known that during the collection of data the machines need to be stopped. Which processing mode should be used for such a scenario? Give reasons for your choice. (5)

(Total: 20 marks)

Question A4
Hot Desert Wind are a new video production company. Their work involves a significant amount of data, currently estimated in the range of 70 terabytes.

a) What backup strategy would you suggest for Hot Desert Wind, considering that they are interested in having fast backups which use the least amount of space possible? Give **TWO** disadvantages of implementing the backup strategy suggested.   (6)

b) Hot Desert Wind has not yet considered having offsite backups. Explain what is an offsite backup and why offsite backups are essential.   (6)

c) Which operation should be carried out on the data before it is transmitted to the offsite backup store in order to increase security?   (1)

d) "When security gets in the way, sensible, well-meaning, dedicated people develop hacks and workarounds that defeat the security." – Bruce Schneier
   i.   What is meant by the above quote?   (1)
   ii. What can Hot Desert Wind implement in order to increase security?   (6)
   (Total: 20 marks)

SECTION B: Human Communication and Business Organisations

Answer the first question in this section and any other TWO questions.

Question B1
This question is compulsory. Answer all parts.

a) Peter wants to create a new organisation with its own legal identity. What organisation type should be sought in this case?   (1)

b) Communication is essential to any organisation. Mention **TWO** technologies related to written communication and **TWO** different technologies related to visual communication. (4)

c) Mention **TWO** different types of organisational structure departmentalisation.   (2)

d) Briefly explain the difference between formal and informal organisations.   (4)

e) What areas should a corporate information security policy cover?   (4)
   (Total: 15 marks)

Questions continue on next page

Question B2
Following a review of the communication channels within a local company, it was evident that no external communication was taking place.

a) Explain external communication.   (2)

b) Highlight the reasons why a company should engage in external communication.   (10)

c) Explain how the management can use **THREE** different external communication methods.
                                                                                                     (3)
                                                                                   (Total: 15 marks)

Question B3
Over the past years a number of incidents about misuse of data have been reported. One prominent case was Cambridge Analytica's misuse of Facebook data.

a) How does the Internet open up avenues for data misuse?   (8)

b) Explain **FOUR** categories of illegal practices in the context of computer-related crime.   (4)

c) What tool can a company use to protect its software intellectual property?   (1)

d) Can piracy ever be of benefit to a software company? Explain your answer.   (2)
                                                                                   (Total: 15 marks)

Question B4
Thomas Woodrow, a former president of the USA, famously said "If you want to make enemies, try to change something". However, change in business is not only natural but necessary for its ultimate survival.

a) Outline **FOUR** reasons why employees tend to resist change.   (4)

b) What factors are to be considered when deciding whether to introduce a change within a company?   (5)

c) GamingBET Ltd is a startup operating in the gaming industry. Since it operates in a very dynamic environment, frequent changes are inevitable. How can this natural resistance to change be overcome in such an organisation?   (6)
                                                                                   (Total: 15 marks)

L-Università ta' Malta

SUBJECT:	**Information Technology**
PAPER NUMBER:	II
DATE:	14th May 2019
TIME:	4:00 p.m. to 7:05 p.m.

Directions to Candidates

A total of **SIX** questions must be attempted; **THREE** from Section A and another **THREE** from Section B.

SECTION A: SOFTWARE

Answer the first question in this section and any other TWO questions.

Question A1
This question is compulsory. Answer all parts.

a) Mention **TWO** Internet client applications.   (2)

b) Social engineering is one of the methods currently used to access an account belonging to someone else.
    i.   What is social engineering?   (2)
    ii. How does this differ from a brute force attack?   (2)

c) What is the purpose of a sitemap in a website?   (2)

d) Mention **TWO** characteristics of the hierarchical and the network data models of each.   (4)

e) Provide a scenario where a distributed database system would be beneficial.   (3)
                                                                      (Total: 15 marks)

Answer any TWO questions from A2, A3 and A4.

Question A2

a) How does general purpose software differ from utility programs?   (3)

b) List and briefly describe any **TWO** other types of application software.   (4)

c) What is **ONE** advantage and **ONE** disadvantage associated with the types of application software mentioned in part (b)?   (4)

d) A company is looking into purchasing an application that helps in managing the details of clients. Apart from the contact details, the company wants to store certain personal information which is relevant to the company and its services. What application software would you recommend for this company? Substantiate your answer with valid reasons.   (4)
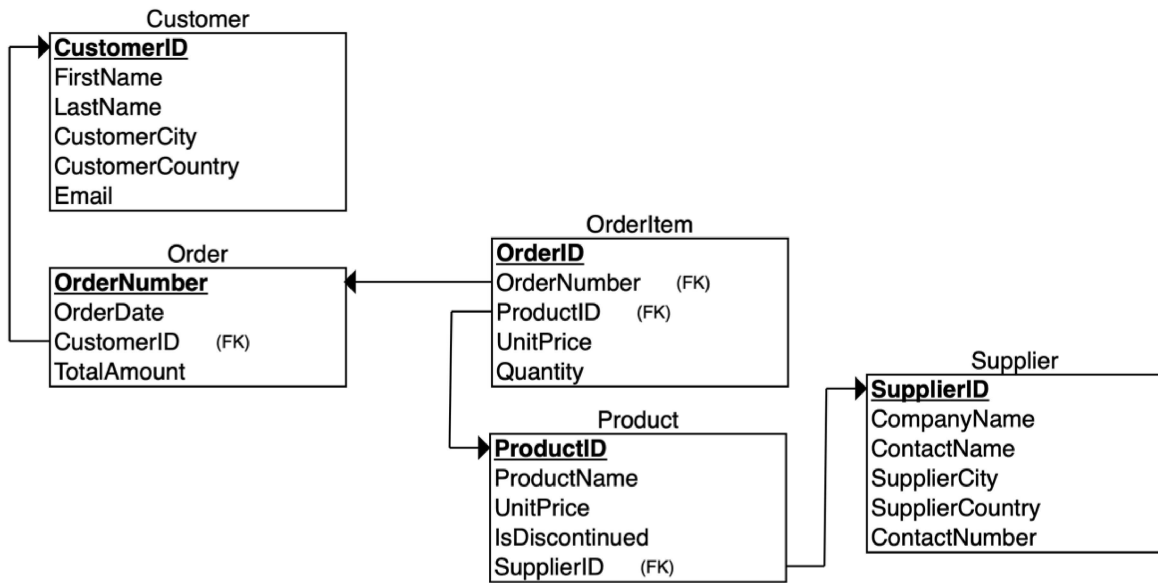   **(Total: 15 marks)**

Question A3

Figure 1 - Database ERD

Figure 1 shows the ERD of a database.

a) Are the relations shown in the 1st, 2nd or 3rd normal form? Substantiate your answer with **ONE** valid reason. (2)

b) List **TWO** primary keys. What is the purpose of a primary key in a database relation? (2)

c) Write SQL statements to extract the following data from the database:
    i.   show the ProductName, UnitPrice and IsDiscontinued for all records from the Product relation. (1)
    ii. show all Product details sorted by UnitPrice in descending order. (1)
    iii. show the product details from suppliers who are based in the city of Valletta. (2)
    iv. show the Order details together with the customer first name, only for those orders from customers having their country set to Malta. (3)

d) State the field types for the following attributes:
    i.   IsDiscontinued – only 0 (FALSE) or 1 (TRUE) need to be inputted; (1)
    ii. SupplierID – this is a 4 digit number followed by 3 alphabet characters; (1)
    iii. ContactNumber – this is an 8 digit number representing a mobile number; (1)
    iv. OrderDate – only the date needs to be stored. (1)
(Total: 15 marks)

Question A4
The Internet Assigned Numbers Authority, IANA, is tasked with overseeing the global IP address allocations.

a) In view of the statement above, what is the function of the Internet Registries such as APNIC and RIPE NCC?   (3)

b) What is the relationship between a domain name and an IP address? Which protocol makes this relationship possible?   (4)

c) Country Codes are one of the most popular TLDs.
    i.   Mention **TWO** other categories of TLDs.   (2)
    ii.   Explain the purpose of TLDs.   (2)

d) Intranets and extranets are tools used to increase productivity.
    i.   Which protocols are usually enabled on Intranets in order to have it function as a local Internet?   (2)
    ii.   What extra features does an extranet provide over an intranet?   (2)
                                                                              (Total: 15 marks)

SECTION B: PROGRAMMING TECHNIQUES AND SYSTEM DEVELOPMENT

Answer the first question in this section and any other TWO questions.

Question B1
This question is compulsory. Answer all parts.

The code below shows a program snippet that fills in an integer array from the user's input.

```
1     import java.util.Scanner;
2     import java.util.*;
3
4     public class QuestionB1{
5
6        public static void main(String []args){
7          int NumbersStore = new int[5];
8            Scanner keyboard = new Scanner(System.in);
9
10           for (int i=1;i<5;i++)
11           {
12                 System.out.println("Enter an integer");
13                 NumbersStore[i] = keyboard.nextInt();
14           }
15        }
16     }
17
```

a) Answer the following questions with regards to the code shown above.
   i.   Identify the **TWO** mistakes that are currently present in the code.   (2)
   ii. Rewrite line 10 using a different control structure.   (2)
   iii. Modify the code so that it shows the contents of the array on the screen before exiting.
                                                                                                  (2)
   iv. Add exception handling to the loop so that the application does not crash should there
        be an input mismatch.   (4)

b) Explain the following SQL statement: (3)

   SELECT productCode, productName, buyPrice
   FROM products WHERE buyPrice BETWEEN 90 AND 100;

c) Explain how the statement in part (b) above should be modified to sort the output by
   productName in ascending order?   (2)

d) Write HTML code to reproduce the table shown below.   (5)

Company	Contact	Country
ABC Ltd	Maria Borg	Valletta
Central Commerce	Tarċisju Spiteri	Mosta
Spinning Wheels	Noel Abela	Mellieħa

(Total: 20 marks)

Question B2

A company wishes to implement a management information system. Their current operations are managed by several separate applications with only a few able to communicate with each other. This requires substantial effort in keeping the system working efficiently.

A report with recommendations was presented to the company. Upon reading the report, the management asked for the following clarifications.

a) What is a high level programming language? (1)

b) What are the advantages of having a modularised approach to application development? (3)

c) The report mentions object-oriented programming. What are the characteristics of object-oriented programming? (4)

d) The report mentions that binary search will be used. What is another option when searching? Why is binary search the preferred method to search? (3)

e) How will it be ensured that the system is easy to maintain? (3)

f) Explain in detail the various methods available for system implementation? (6)

(Total: 20 marks)

Question B3

a) Outline **THREE** benefits that IDE's provide when developing applications over simple text editing applications such as Notepad. (3)

b) When developing applications, inadvertently syntax errors, logical errors and run-time errors are included. Provide sample code in JAVA which highlights the three different program errors. Where required, apart from the code, present a sample run. (9)

c) Structured programming is a subset of the procedural programming paradigm. Discuss how this relates to object-oriented programming in terms of their general approach, features, reusability, flexibility and intended use. (8)

(Total: 20 marks)

Questions continue on next page

Question B4

Following the emergence of digital banking company Revolut, a local bank is looking into updating its business model through the use of a more comprehensive mobile application. The bank prepared the Use Case diagram shown in Figure 2.
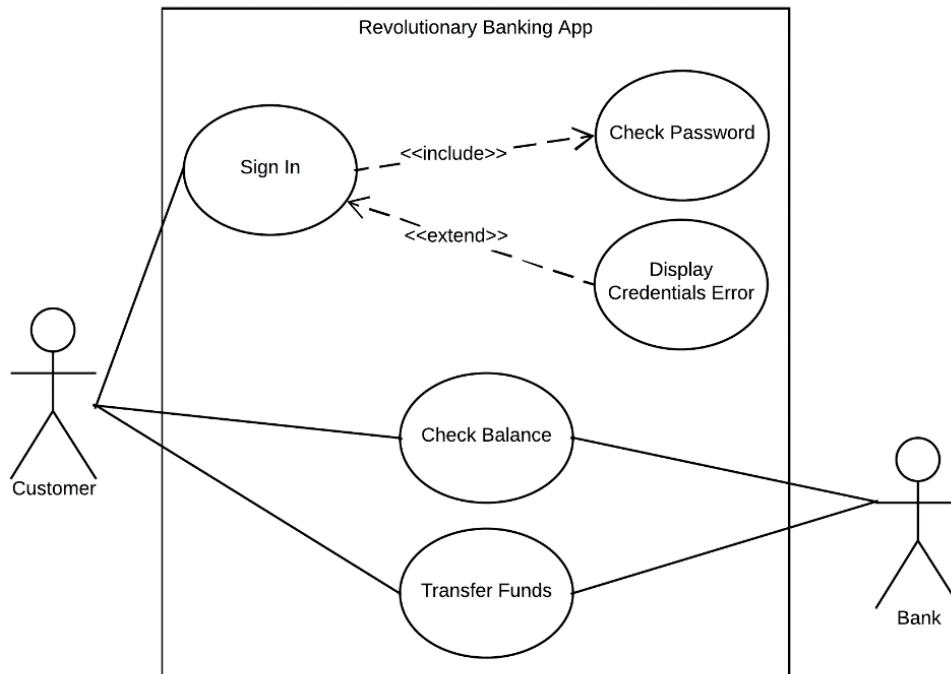

Figure 2 - UML Use Case Diagram

a) Identify **ONE** actor. (1)

b) Provide a brief description of the *Sign In* use case. Your description should mention who initialises the use case, as well as the relationship the *Sign In* use case has with other use cases. (4)

c) How should the use case diagram be modified in order to show that the *Transfer Funds* use case requires that the app always checks if there are sufficient funds beforehand? (4)

d) Modify the use case diagram in order to add a *Make Payment* use case. In this feature, a customer will affect a payment and hence the application also needs to check if there are sufficient funds. Payments can be either from a Savings account or from a Current account. Once the required details are provided the data is sent to the bank for further processing. (11)

(Total: 20 marks)