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INFORMATION AND COMMUNICATION TECHNOLOGY

0417/12

Paper 1 Theory

February/March 2023

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].
- No marks will be awarded for using brand names of software packages or hardware.

This document has 12 pages.

- 1 (a) Explain what is meant by the term software.

Software refers to programs that control the computer system and process data. [1]

- (b) State the two types of software used by computers.

- 1 Application software - provides services required by users to solve given tasks. e.g. word processing, spreadsheet, database
- 2 System software - provides a platform on which all other software can run. e.g. device drivers, compilers, linkers, operating systems... [2]

- 2 Tick (✓) the device which produces hard copy.

A Buzzer

☐

B Laser printer

☒

C Touch screen

☐

D Webcam

☐

[1]

- 3 State three items that should be included in the technical documentation of a computer system.

Technical documentation is designed to help programmers to make improvements to the system or repair/maintain the system. It consists of:

- 1 improvements to the system or repair/maintain the system. It consists of:
- 2 - Programming language used
- 3 - Program listing / coding
- Program flowcharts / algorithms
- System flowcharts
- Hardware requirements
- Software requirements
- File structures
- Purpose of the program/system
- Limitations of the system
- List of variables
- Input formats
- Output formats
- Validation rules
- Sample runs / test runs
- Meaning of error messages

[3]

4 Young people use the internet for research and communication.

(a) Search engines can be used to research information on the internet.

Describe **three** benefits of using a search engine to find information.

- 1 A search engine is a software program / computer program that finds information on the internet by looking for keywords/phrases.
Benefits:
- 2 - Fast and easy to find information needed using keywords
- More relevant websites are on top of the list
- 3 - Information on the internet is free of charge.
- Amount of information found is reduced making it easier to find relevant information

[3]

(b) Social media can be used to communicate with friends.

Give **four** precautions that young people should take when using social media.

- 1 - Do not disclose personal data
- Do not use inappropriate language
- 2 - Do not post inappropriate images
- Do not post images that can lead directly to you
- 3 - Set status to private
- Block/Report unwanted users
- 4 - Do not arrange to meet online strangers face to face
- Do not meet people you do not know alone
- Respect people's privacy/confidentiality
- Do not use your real name for the social media name

[4]

- 5 The number of people using online shopping has increased. This has led to an increase in the number of journeys for the delivery drivers.

Describe how an expert system can be used to produce the best route for the delivery of items.

Expert systems are systems that mimic the expertise and.....

knowledge of an expert in a particular field.

→ User Interface

This is the method by which the expert system interacts with a user.

This user interface could be used to ask the user questions about the route and the user could answer the question with Yes/No answers

The places/areas visited, start/end points could be entered into the UI.

→ Inference Engine

This is the main processing element of the expert system. It acts as

the search engine examining the knowledge base for information that

matches the queries by using inference rules in the rules base.

→ Knowledge Base

- Is a repository of facts which stores all the knowledge about an area

of expertise obtained from a number of expert resources. The knowledge

base is searched for suitable routes between two points. Probable routes are displayed [6] on the UI.

→ Rules Base

- Is a set of inference rules, used by the inference engine to draw conclusions.

- 6 Bluetooth is a method of wireless communication.

State two devices found in the home which could be connected via Bluetooth.

1 Bluetooth offers wireless communication between devices by use of

2 electromagnetic radiation as the carrier of data transmission.

Bluetooth sends and receives radio waves in a band of 79 different frequencies/channels. When a device wants to communicate, it picks [2] one of the 79 channels at random to pair with another device. If the channel is already being used, it randomly picks another channel. Once paired to minimize risk of interference with other devices, the devices constantly change the channels they are using several times each second. This is called spread spectrum frequency hopping.

Devices:

- Smartphone
- Printer
- Headphone
- Keyboard

7 Describe the characteristics of a primary key and a foreign key.

(a) Primary key

A Primary Key is a field of unique data used to identify that record.

Characteristics:

- It is unique
- It cannot be a null value
- It identifies a record.

[2]

(b) Foreign key

A Foreign Key is a field in one data table that stores values from a primary key field in another table.

Characteristics:

- Only present in relational databases
- It is a Primary Key in another table
- Acts as a link in relationships between tables

[2]

8 Many devices in the home can connect to the internet. These are called smart devices.

Describe four benefits of using these smart devices.

- Smart TVs allow view on demand via the internet
- Smart TVs allow programs to be recorded remotely
- Smart fridges allow food to be automatically added to the food order.
- Increased sense of security in homes due to monitoring the CCTV remotely.
- Automated burglar alarms give people a sense of security as they offer a sophisticated level of intruder warning at all times.
- It is possible to control ovens/automatic washing machines using smart phones - a web enabled phone allows devices to be switched on and off remotely.
- Smart devices send alerts to owners phone/portable device.
- Can control power to devices remotely / from anywhere in the home thus saving money

[4]

9 A web page can contain three web development layers. One of these is the content layer.

(a) State one use of the content layer. Also called the structure layer.

This layer is where the content of the webpage such as text and images are placed. Also where the page structure e.g tables, frames, hyperlinks etc. are placed. [1]

- Holds the information of the webpage & creates the structure of the webpage

(b) Identify the other two web development layers and give a use for each.

1 Presentation layer - is where the visual impact of the webpage

Use is created and contains the styles to be used such as colour themes,

fonts etc. Displays elements within the page, holds the CSS/style sheet, defines the styling/format of the webpage, maintains consistency of the webpage elements.

2 Behaviour layer - is where all actions such as controlling elements (except hyperlinks)

Use on a webpage are created. Usually created using scripting languages like JavaScript

- It holds the image galleries, forms
- Adds interactive content to the webpage
- Adds functionality to the webpage
- Controls elements within the webpage

[4]

10 Some computers have touch screens.

Describe three benefits of using a touch screen.

1 Allows users to use zoom and pinch making item selection quick / option to expand the size of the display if necessary.

2 Improves hand/eye coordination

3 Leaves a small footprint

- Quick selection options provision / Easy method of choosing options
- Is user friendly as no training is necessary
- Faster entry of options than using a keyboard or a mouse

[3]

11 A student has downloaded a file which contains a virus.

(a) Describe the possible effects on his computer system if he opens the file.

A virus is a program that replicates/copies itself with the intention of deleting or corrupting files and causing a computer to malfunction.

Effects:

- Causes computer processing to slow down.
- Causes computer to crash.
- Deletes/corrupts files, programs or data
- Causes unexpected popups/messages to appear on screen

[2]

(b) Explain how the student could prevent the computer from being infected by viruses.

- Use an up-to-date anti-virus software
- Regularly scan the computer for viruses
- Only open email attachments from sources/people you trust
- Scan all portable storage media before downloading files/software
- Don't download and use software from unknown sources.

[3]

(c) Some files containing viruses have to be quarantined as they cannot be deleted.

(i) State the type of files that may have to be quarantined rather than deleted.

System files - are critical computer files without which a computer system may not operate correctly. [1]

(ii) Explain how the software detects and quarantines the file.

The anti-virus software scans the computer for viruses. If a virus is found, it alerts the user that the file needs to be quarantined. The anti-virus rescans the computer to check for further viruses.

The anti-virus allows the user to accept/reject the quarantining of the file. If the file is to be quarantined, it is moved to a hidden/locked directory. The user cannot access the quarantined file. [3]

12 A tennis coach is creating a presentation to explain to teenagers the basics of playing tennis.

(a) Describe the design features that must be included to make the presentation appeal to the teenagers.

- Use of interactive elements
 - Use of background music/sound (audio-visual)
 - Balance of pictures and text
 - Use of videos/animation relating to the topic
 - Use images related to the topic
 - Consistent layout across all the slides
 - Balanced use of white space and content
 - Use bullet points as easier to absorb information
 - Balance of size between headings and text
- [4]

(b) The designer needs to be aware of copyright legislation when creating the presentation.

Explain the need for copyright legislation.

Copyright is a type of intellectual property that gives the owner of the copyright the exclusive right to make copies of the work. It allows the owner to give permission for others to use the work.

[2]

13 People can watch a movie either by streaming or from a Blu-ray disc.

Give **two** advantages of watching the movie by streaming rather than from a Blu-ray disc.

Streaming is a continuous transmissi~~on~~ of video or audio from a remote server where the files are stored.

- Blu-ray discs are an example of optical storage media.
- Advantages
- Cheaper to stream rather than buying the Blu-ray player
 - Streaming uses a simpler interface
 - Streaming works on different internet connected devices.
 - Streaming is on demand and can be accessed from anywhere so long as there is internet connectivity.
- [2]

14 Compare RAM and ROM. Your answer must include similarities and differences.

- RAM is an internal chip where data is temporarily stored when running applications. This memory can be written and read from. It is volatile memory, meaning, its contents are lost when power to the computer is turned off.
- ROM is a memory used to store information that needs to be permanent. It cannot be altered and can only be read from.

Similarities

- Both are internal memory
- Both are primary memory
- Data on both can be read
- Both are directly accessed by the CPU

Differences

- RAM is volatile while ROM is non-volatile
- RAM is temporary memory while ROM is permanent memory
- RAM data can be read from and written to while ROM data is only read from
- RAM is used to store the current program/instruction while ROM stores the start up instructions.

[4]

15 Tawara Stores is a small company that does not make much profit. The managing director is deciding whether to implement a new IT system using direct changeover or parallel running.

Describe the advantages and disadvantages of using direct changeover compared with parallel running in this scenario.

Advantages

- Direct changeover benefits are immediate whereas in parallel running it takes time for the new system to be fully running
- Direct changeovers save on cost as they only have to pay for one set of staff
- Only one computer system is needed for direct changeover hence saving on cost
- Maintenance is cheaper in direct changeover as only one set of

Computer system is maintained

- Data is only entered once hence saves on duplication of data
- The new computer system is checked thoroughly before implementation

Disadvantages

- The staff have to be trained hence incurring training costs. The staff have to be fully ready to use the new system before it is implemented
- Staff cannot be trained on the new system whereas in parallel both systems run concurrently
- If any problem arises that risks loss of data, direct changeover could lose all the data which could be disastrous whereas in parallel running there is an original system
- With direct changeover, staff cannot be trained gradually whereas in parallel this can be achieved

[6]

- 16 A school car park is controlled by a barrier. When teachers enter the car park their number plate is read and the barrier is raised automatically.

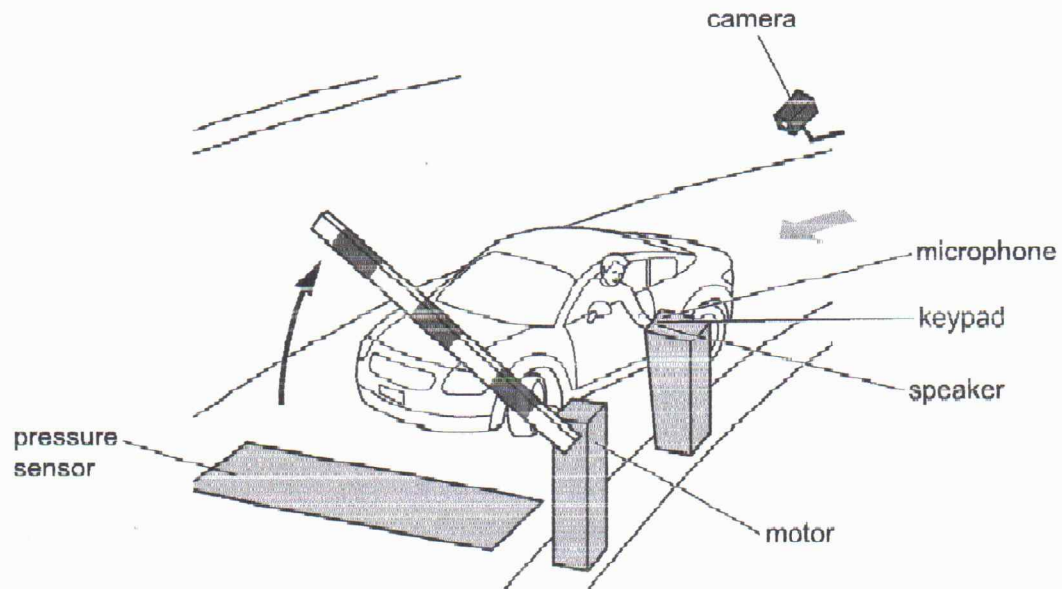


Fig. 16.1

- (a) Visitors can use the keypad as an input device to enter a code which allows the barrier to be raised.

Identify three other input devices shown in Fig. 16.1.

- 1 Camera
- 2 Microphone
- 3 Pressure sensor

[3]

- (b) Automated Number Plate Recognition (ANPR) is used to read and check the number plate of the vehicle.

Discuss the benefits and drawbacks of using an ANPR system.

Benefits

- ANPR saves time in having to check the number plates manually.
- Less errors as the recognition system is automatic.
- Saves money as there is no need to check the number plates manually.
- ANPR is more secure than manual as it only allows stored vehicles.
- Drawbacks
- All vehicles need to be added to the database.
- Data in the database needs to be kept up to date.
- The ANPR system is expensive to setup and maintain.
- Obscured number plates are difficult to read.
- Some number plates cannot be read due to odd font/sideways.

[6]

Please turn over for Question 17.

17 Verification and validation are used to check data.

- (a) Identify and describe two methods of verification. *Verification is a way of preventing errors when data is copied from one medium to another. It does not stop all errors but helps reduce errors made when data is input into a system by checking accuracy of data entry.*

Method 1 *Visual Verification - also known as visual check,*

Description *is checking for data errors by comparing the original paper documents with the data entered into the system. - Double data entry - data is entered into a system twice. The two sets of data are then compared by the computer and if there is a difference in the data, it is flagged as an error.*

Method 2 *Validation is the process when data entered into a computer is checked to see if it satisfies certain criteria; automatic checks done by a system.*

Description *Types of Validatable Checks*

- Range check - checks if data input lies between acceptable upper & lower values
- Length check - checks if data input contains only the required no. of characters
- Format check - if the data input is in the correct format
- Presence check - if data has been entered into a field; it has not been left empty
- Check Digit - extra digit added to a number which has been calculated from the other digits.

[4]

(b) Explain the following validation checks.

(i) Presence check

Checks that data has been entered into a field and it has not been left empty. [1]

(ii) Type check

Checks to see if the data entered is of the correct type i.e. letter or number only. [1]

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