PECANWOOD
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INFORMATION TECHNOLOGY THEORY EXAMINAITION.
GRADE 10

NAME: Memos **GRADE:** _____

DATE: 11 JULY 2023 **MARKS: 110**
EXAMINER: MR SC EILERTSEN **TIME: 2 HOURS**
MODERATOR: MR C SEEWALD

INSTRUCTIONS:

1. This examination is made up of 16 pages. The questions are stapled together, and the resource materials are separately stapled together (the scenario and the addendums) Please ensure that your paper is complete.
2. Reading time – It is suggested that you read the scenario during the reading time allowed. The scenario is separate from the question paper.
3. In all cases use the mark allocation and the space provided to determine the amount of detail a question requires.
4. It is in your own interests to write clearly with a dark-coloured pen.
5. You may use a non-programmable calculator.
6. Additional paper is provided at the end of this examination. If you use it, please label your answer clearly using the same numbering as the exam paper.
7. NOTE: In grade 10 we use a two-hour theory examination paper. Two hours however is not enough time to test every topic we have studied. In grade 11 however the 3-hour paper allows every topic to be tested.
8. I hope you have as much fun answering the examination paper as I did setting it.

Question One **Data representation**

1.1) Fill in the following table which shows the same number (on each line) represented in decimal, binary and hexadecimal. You can use the additional paper at the end of the exam paper for your workings (which will not be marked – only the answers here in the table below)

Question	Base 10	Base 2	Base 16
1.1	**37**	100101	25
1.2	249	**11111001**	F9
1.3	703	1010111111	**2BF**

(6)

1.2) Consult addendum A that shows the ASCII codes for all the letters of the alphabet as well as numbers and special characters. Java uses these ASCII code values to sort words (Strings) into alphabetical order. Using the table as a point of reference sort the following list of 5 items into alphabetical order.

Unsorted list of 5 items	Your sorted list
5 apple Cat a ?	5 ✓ ? Cat a apple ✓

(3)

1.3) Explain why the following IT joke is funny

"People who understand binary fall into 10 groups – those that do and those that don't."

10 refered to here is 10 base 2 = 2 ✓
∴ there are only 2 groups of people ✓

(2)

[11]

Question Two: **Overview of computers, hardware and software. Short questions.**

Within the computer environment we use many different terms.

Choose **one** term – the best choice – to match the definitions/ descriptions below. **You may ONLY use the terms in the list called addendum B**

2.1) This type of software licensing agreement means that the software is free, you can use it and you can distribute it. In addition, you have access to the code and can therefore make changes to the code. If you modify or add to the original code, you are obliged to make your code available to others. An example of this is the OS called Linux

Open - source license (1)

2.2) This allows many different users to use the same computer – each user will have different rights and permissions. In addition, their own work when saved, cannot be accessed by other people who use the same computer. They can customize their desktop and may have access to software that other users may not have.

User profile (1)

2.3) This is a powerful central computer that other computers have access to. This computer may store files, control printing, control access to the internet, store the company database or even cache data to speed up network performance.

Server (1)

2.4) This is software that is intended to disrupt, disable, degrade, or corrupt data on a single computer, or even on a network. This software could be illegal, or only just annoying or could be an infringement on privacy.

Malware (1)

2.5) This is a piece of hardware, not plugged directly on to the motherboard but instead is plugged into the computer via a port e.g. a USB port.

Mouse peripheral flash drive (1)

2.6) A type of secondary memory that is often plugged into a camera to store images. When full it can be removed, and another plugged into its place. Therefore, it is hot-swapable.

SD card (1)

2.7) An input device that automatically, without human intervention, provides input to a computer program.

Sensor (1)

2.8) A way of directing a user to a particular resource e.g. a web page or a form without having to use a keyboard or mouse. This prevents user errors and typing mistakes.

QR code adware (1)

2.9) A newer type of secondary storage that is very fast, has no moving parts, is relatively small and when compared to a traditional hard drive, is quite expensive.

SD card SSD flash drive (1)

2.10) Volatile primary memory

RAM (1)

[10]

From here onwards many questions are based on your understanding of the scenario

Question Three **Data representation**

3.1) A database needs to be designed for the scenario. Information must be logically grouped into separate tables.

Choose ONE aspect/topic and design a table for that one topic. Your design must include field names, the datatype for each field and an example.

NOTE: Your table must have a minimum of six fields. You must use **three** different datatypes. Your example must illustrate the field and match the datatype you have chosen for that field.

Name of the table:		
Field Name	**Datatype of the field**	**My example to illustrate the field**
1 n	n	n
2 n	n	n
3 n	n	n
4 n	n	n
5 n	n	n
6 n	n	n

(10)

Question 4 **Computer hardware and overview.**

4) Consider the diagram in **Addendum C** for the questions that follow.

4.1) Does the diagram represent a computer, a laptop, a tablet, a smartphone, all of these All (1)

4.2) Explain the difference between **primary memory** and **secondary memory** – indicate which are **volatile** and which are **non-volatile.**

primary temporary RAM volatile

secondary permanent eg hard drive non volatile

(4)

4.3) Desktop computers will be used in the call centre. Operators will monitor all platforms and update the database with information as it becomes available. Where will the database be stored?

Secondary memory (1)

HDD

SSD

4.4) Name the different parts of the CPU and give a brief description of each.

ALU - Calculations, comparisons
CU - instructions what to do
eg read, write
registers - holds the next instruction
before/after execution (4)

4.5) Continuing to look at the diagram addendum C an operator asks about the motherboard – where is it – why is it missing off the diagram – what role does the motherboard play? Answer this question below.

Does no processing. Merely connects the various components. Provides platform for power. Allows upgrading and customisation

(4)

4.6) Will the database store "data" or "information"? Explain your answer.

Information - structured data that allows data to be queried, analaysed, searched (3)

4.7) In the case of a desktop computer how will it achieve "communication"? (see diagram addendum C)

Via network card + network cable to LAN
Via WiFi: if the computer has a WiFi capabilities to wireless access point (3)

4.8) In the case of a smart phone offering Twitter and WhatsApp. How will it offer "communication"?

Has a SIM card. Can connect wirelessly to mobile phone towers

(3)

4.9) Each rescue team of 6 people is equipped with 6 **smart phones**, 1 **laptop** and 2 **two-way radios**. (If you are not sure what a two-way radio is you can consult the addendum **terminology** section). Each rescue team is equipped with two vehicles – each vehicle has a **tracker** device which broadcasts the vehicle's position via radio waves to the call centre so that they can see their exact location in real time.

4.9.1) What advantage does the smart phone offer the team? Instant person to person communication (1)

4.9.2) What advantage does the laptop offer? Access information
Upload information (1)

4.9.3) What advantage does the two-way radio offer? Team to team communication. Redundancy. (1)

4.10) "Synchronisation is the process where the data on any digital device is consistent with every other digital device on the same platform or network". Does Twitter, WhatsApp and Instagram loaded on the smartphones achieve "synchronisation"? Explain.

Yes. Regardless of the device, account, platform or time of day, they show the same information. (3)

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Question 5 **System Software – Operating Systems**

5.1) Suggest/name an operating system for the desktop computers Windows Linux (1)

5.2) Suggest/name an operating system for the laptop computers Windows Linux (1)

5.3) Suggest/name an operating system for the two-way radios. Not applicable (1)

5.4) The operating system on the vehicle trackers is not the same as the larger computing devices. Explain in what way their operating system would be different. (If you are not sure about a GPS vehicle tracking device you can consult the addendum terminology section.)

OS is embedded into the device before being shipped to client. No GUI. Not customisable by client (3)

5.5) Consult the diagram called **addendum D**. Briefly explain the following labels found on the diagram.

5.5.1) User: The person using the computer (1)

5.5.2) Application:

The software they are using (1)

5.5.3) Operating system: (Do not overlap with question 5.6)

The software that makes the compater work (1)

5.5.4) System utility: (You can give examples here as well)

Additional software that assist with maintenance and "house keeping" (1)

5.5.5) Drivers:

Small software programs that communicate with specific pieces of hardware allowing them to work. (1)

5.5.6) Hardware:

Any piece of digital computer equipment (1)

5.6) Briefly explain the role of the operating system on a desktop computer.

Manages resources ✓
Provides a GUI ✓
Load + runs programs ✓
Any other relevant point ✓

(4)

[16]

Question 6 **Computer Networks**

6.1) Is this emergency call centre of the city of Walatozer implementing a LAN, MAN, WAN, GAN, PAN or a HAN?

MAN (1)

6.2) The call centre, housed in one building, will have a server and 5 client computers connected to it thereby implementing a client-server configuration. The traditional LAN with a switch will use UTP cabling to ensure connectivity between the clients and the server.

6.2.1) What are the advantages of UTP cabling?

Inexpensive + easy to install ✓
Fast ✓
Widely used + tested ✓

(3)

6.2.2) What are the disadvantages of UTP cabling bearing in mind that it is made of copper.

Interference
Crosstalk
Distance limitations
attenuation (4)

6.3) A computer network does have some disadvantages. List three of them.

Security issues
Malware can spread
Cost
Dependency on central servers (3)

6.4) "If a major earthquake were to hit the city, a network based on unbounded media would be more likely to continue to function despite damage to buildings and infrastructure".

Discuss the statement and explain why it is probably correct.

Cables can be damaged, difficult to repair microwave & radio as less likely to be damaged and are probably easier to repair if slightly damaged. (3)

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Question 7 **Algorithm development**

Study the flowchart called **addendum E**. This algorithm is designed to map people's names to radio call signs. Eg Steve Eilertsen has a 5-character call sign of ZA-47. The algorithm must reject improper input. Once successfully typed from the keyboard the algorithm must append (write) the name followed by the call sign to a text file. "Append" means "add the entry to the **bottom** of the file".

Once you are comfortable with the process shown in the flowchart fill in the trace table below using the information typed in from the keyboard. The information typed from the keyboard is in the box to the right of the flowchart.

You must show the effect of the loop in the trace table i.e. where line numbers are repeated over and over again until the condition is met. You must also show the condition being true and finally becoming false.

Line number	counter	name	callsign	While condition. True or false	Output that is appended to the text file
1	0				
2				T	
3		Steve Eilertsen			
4			ZA-47		
5				F	
6	1				
7					Steve Eilertsen ZA-47
2				T	
3		mike Handle			
4			UK-98		
5				F	
6	2				
7					Mike Handle UK-98
2				T	
					Table continues on the next page

	counter	name	call sign	while T/F	Output appended.
3		Lungile Zamisa			
4			US-67		
5				F	
6	3				
7					Lungile Zamisa US-67
2				T	
3		Emihle Ndabeni			
4			ZA-3		
5				T	
4			ZA-30		
5				F	
6	4				
7					Emihle Ndabeni ZA-30

loops visible (9)

Question 8 **Boolean Logic**

8.1) A friend asks you to check their implementation of De Morgan's Law for the Boolean expression (A'+ B' + C)'

He says that is the negation of (A'+ B' + C)'is (A+ B + C) – that they are equal.

Prepare a truth table for all values of A, B and C and show that he is incorrect – they are not equal.

A	B	C	(A'+ B' + C)'	Workings			(A+ B + C)	Workings	
0	0	0	(0'+0'+0)'	(1+1+0)'	(1)'	0	(0+0+0)	0	
0	0	1	(0'+0'+1)'	(1+1+1)'	(1)'	0	(0+0+1)	1	
0	1	0	(0'+1'+0)'	(1+0+0)'	(1)'	0	(0+1+0)	1	
0	1	1	(0'+1'+1)'	(1+0+1)'	(1)'	0	(0+1+1)	1	
1	0	0	(1'+0'+0)'	(0+1+0)'	(1)'	0	(1+0+0)	1	
1	0	1	(1'+0'+1)'	(0+1+1)'	(1)'	0	(1+0+1)	1	
1	1	0	(1'+1'+0)'	(0+0+0)'	(0)'	1	(1+1+0)	1	
1	1	1	(1'+1'+1)'	(0+0+1)'	(1)'	0	(1+1+1)	1	

(9)

8.2) Correctly negate the Boolean expression (A'+ B' + C)' using De Morgan's Law A . B . C' (2)

[11]

GRAND TOTAL: 110

Scenario **Application of what you have learned in IT theory**

The city of Walatozer sits on a fault line and earthquakes are becoming increasingly powerful. Therefore, the town decides to set up an emergency information **call centre** that is staffed 24 hours a day. The idea of the centre is to coordinate the whole town during an emergency incident i.e. coordinate Information found on all digital platforms and make it available to anyone who needs it in real time (information from social media, information from two-way radios being used by rescue teams, and information from telephone calls). Rescue teams are as follows:

- Rubble removal and finding victims
- Medical
- Fire fighting
- Flood control

All information harvested is captured into a **database** by emergency operators. The same operators can therefore give relevant up to date information to anyone needing it.

Examples:

1. Names of people who are missing
2. Names of people who have been found and their condition
3. Where a specific team is working and what they are doing
4. Which roads are closed
5. Which buildings are seriously damaged.
6. Location of fires
7. Location of flooding etc etc

firstName €
lastName €
NickName €
Where found €
Where Now €
Condition 1–5 number
family Aware Y/N.

N/S −25.7371466
WE 27.8201723

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introduction to databases

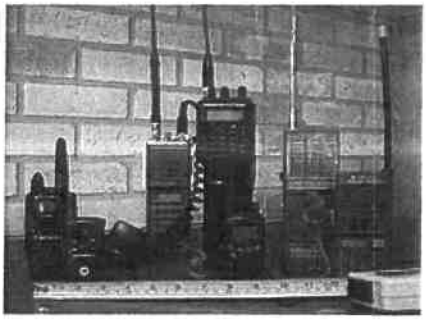
Additional Paper. Label your answer please.

line	counter	name	call sign	While T/F	Output appended
2	1			T	
3		Laura NKuna			
4			ZA-61		
5			F		
6	5				
7					Laura NKuna ZA-61
2				T	
3		Demo Sharply			
4			UK-76		
5				F	
6	6				
7					Demo Sharply UK-76
2				F	
End.					

Addendum: Terminology

A two-way radio is a radio transceiver (a radio that can both transmit and receive radio waves), which is used for bidirectional person-to-person voice communication with other users with similar radios,[1] in contrast to a broadcast receiver, which only receives transmissions.

Two-way radios usually use a half-duplex communication channel, which permits two-way communication, albeit with the limitation that only one user can transmit at a time. (This requires users in a group to take turns talking.



GPS tracking is the surveillance of location through use of the Global Positioning System (GPS) to track the location of an entity or object remotely eg a vehicle. The technology can pinpoint longitude, latitude, ground speed, and course direction of the target.

GPS Tracker,Mini Magnetic GPS Real time Car Locator,Long Standby Portable Real-Time Positioning Tracking Device for Vehicles, Kids, Elder, Pets, Trucks

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