PECANWOOD
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INFORMATION TECHNOLOGY THEORY EXAMINAITION.
GRADE 10

NAME: _____ **GRADE:** _____

DATE: 11 JULY 2023
EXAMINER: MR SC EILERTSEN
MODERATOR: MR C SEEWALD

MARKS: 110
TIME: 2 HOURS

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**		
1.2		**11111001**	
1.3			**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 ?	

(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."

_____

_____

_____

_____ (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

_____ (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.

_____ (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.

_____ (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.

_____ (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.

_____ (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.

_____ (1)

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

_____ (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.

_____ (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.

_____ (1)

2.10) Volatile primary memory

_____ (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**

(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 _____ (1)

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

_____ (1)

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

_____

_____

_____

_____

_____ (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.

_____

_____

_____

_____

_____ (4)

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

_____

_____

_____ (3)

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

_____

_____

_____ (3)

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

_____

_____

_____ (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? _____

_____ (1)

4.9.2) What advantage does the laptop offer? _____

_____ (1)

4.9.3) What advantage does the two-way radio offer? _____

_____ (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.

_____

_____

_____ (3)

[29]

Question 5 **System Software – Operating Systems**

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

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

5.3) Suggest/name an operating system for the two-way radios. _____ (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.)

_____

_____

_____ (3)

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

5.5.1) User:

_____

_____ (1)

5.5.2) Application:

_____

_____ (1)

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

_____

_____ (1)

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

_____

_____ (1)

5.5.5) Drivers:

_____

_____ (1)

5.5.6) Hardware:

_____

_____ (1)

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

_____

_____

_____

_____

_____ (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?

_____ (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? _____

_____

_____

_____

_____ (3)

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

_____

_____

_____

_____ (4)

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

_____

_____

_____

_____ (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. _____

_____

_____

_____

_____ (3)

[14]

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
					Table continues on the next page

(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	

(9)

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

Addendum A **Question one**

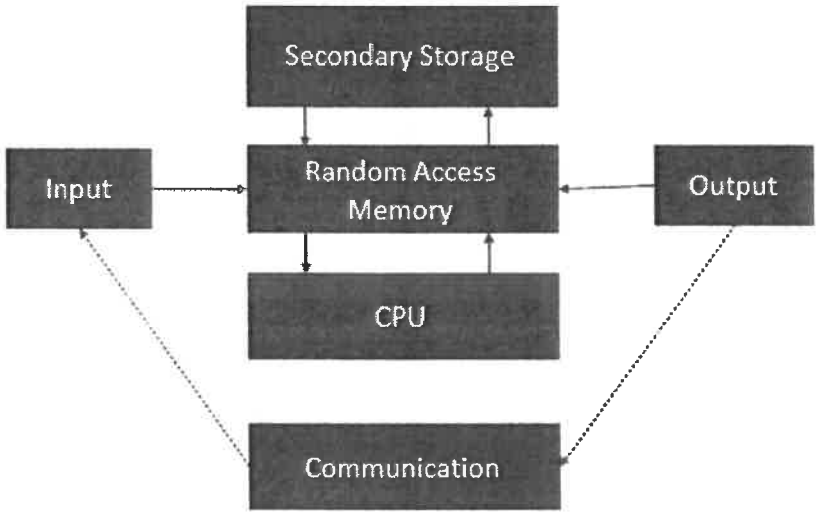
ASCII TABLE - UNICODE TABLE

Dec	Hex	Chr	Dec	Hex	Chr	Dec	Hex	Chr
0	0	null	64	40	@	97	61	a
32	20	Space	65	41	A	98	62	b
33	21	!	66	42	B	99	63	c
34	22	"	67	43	C	100	64	d
35	23	#	68	44	D	101	65	e
36	24	$	69	45	E	102	66	f
37	25	%	70	46	F	103	67	g
38	26	&	71	47	G	104	68	h
39	27	'	72	48	H	105	69	i
40	28	(	73	49	I	106	6A	j
41	29	)	74	4A	J	107	6B	k
42	2A	*	75	4B	K	108	6C	l
43	2B	+	76	4C	L	109	6D	m
44	2C	,	77	4D	M	110	6E	n
45	2D	-	78	4E	N	111	6F	o
46	2E	.	79	4F	O	112	70	p
47	2F	/	80	50	P	113	71	q
48	30	0	81	51	Q	114	72	r
49	31	1	82	52	R	115	73	s
50	32	2	83	53	S	116	74	t
51	33	3	84	54	T	117	75	u
52	34	4	85	55	U	118	76	v
53	35	5	86	56	V	119	77	w
54	36	6	87	57	W	120	78	x
55	37	7	88	58	X	121	79	y
56	38	8	89	59	Y	122	7A	z
57	39	9	90	5A	Z	123	7B	{
58	3A	:	91	5B	[	124	7C	|
59	3B	;	92	5C	\	125	7D	}
60	3C	<	93	5D	]	126	7E	~
61	3D	=	94	5E	^	127	7F	DEL
62	3E	>	95	5F	_	128	80	Ç
63	3F	?	96	60	`	129	81	ü

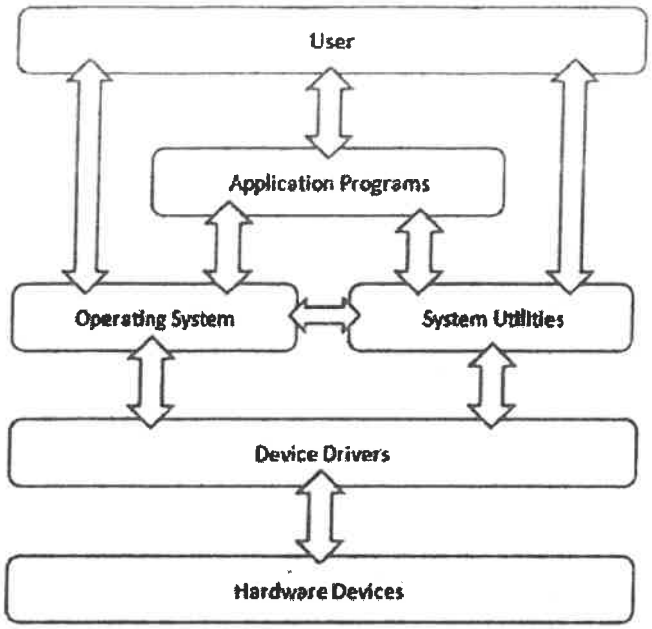
Addendum B **Question Two – Computer terms**

Computer	printer	scanner	Microsoft Word	RAM
Hard drive	CPU	primary memory	application software	register
Java	SD card	QR code	sensors	source code
Server	peripherals	backup	archive	tablet
Malware	adware	mouse	smartphone	single board computer
Executable code	server	Freeware	information	Windows 10
drivers	screen	secondary memory	OS	mobile device
USB port	ALU	data	motherboard	SSD
Flash drive	GUI	ROM	biometric	HDMI
Control panel	IDE	user profile	file compression	Open-source license
Product key	3G card	file and folders	hot swappable	anti-malware
Command line interface		BIOS		

Addendum C **A modern computing device. Question 4**



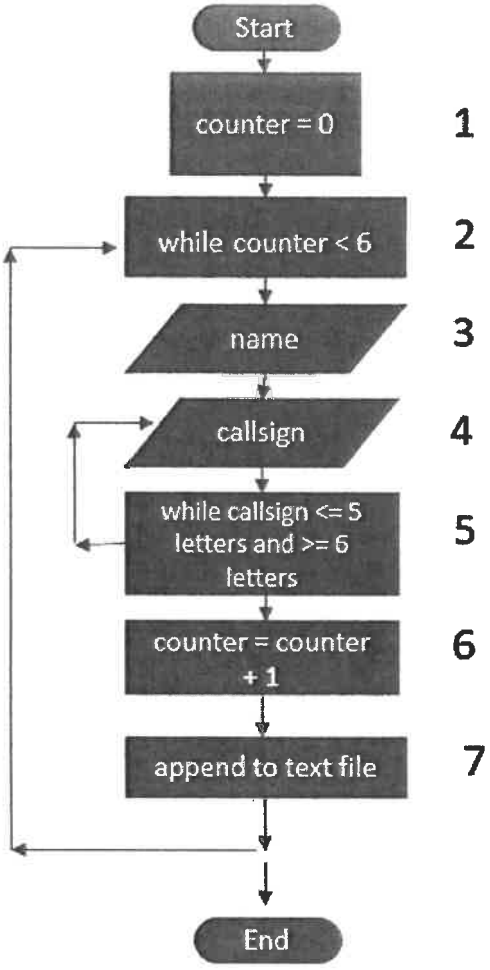
Addendum D. Question 5



http://cs.sru.edu/~mullins/cpsc100book/module05_SoftwareAndAdmin/module05-02_softwareAndAdmin.html

Addendum E. **Question 7.**

The flowchart, the line numbers and then the input that comes in from the keyboard

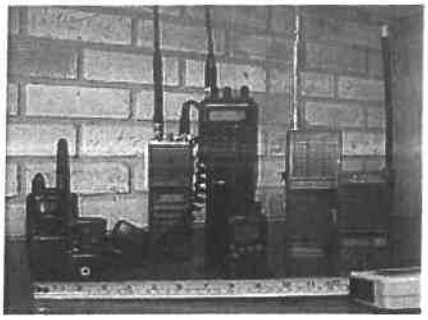


Data from keyboard
Steve Eilertsen
ZA-47
Mike Handle
UK-98
Lungile Zamisa
~~USA-675~~ US-67
Emihle Ndabeni
ZA-3
ZA-30
Laura Nkuna
ZA-61
Demo Sharply
UK-76

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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- Product SKU: B099F2FL22
- Category: GPS Accessories

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Additional Paper. Label your answer please.