

SURNAME: Kovalenko

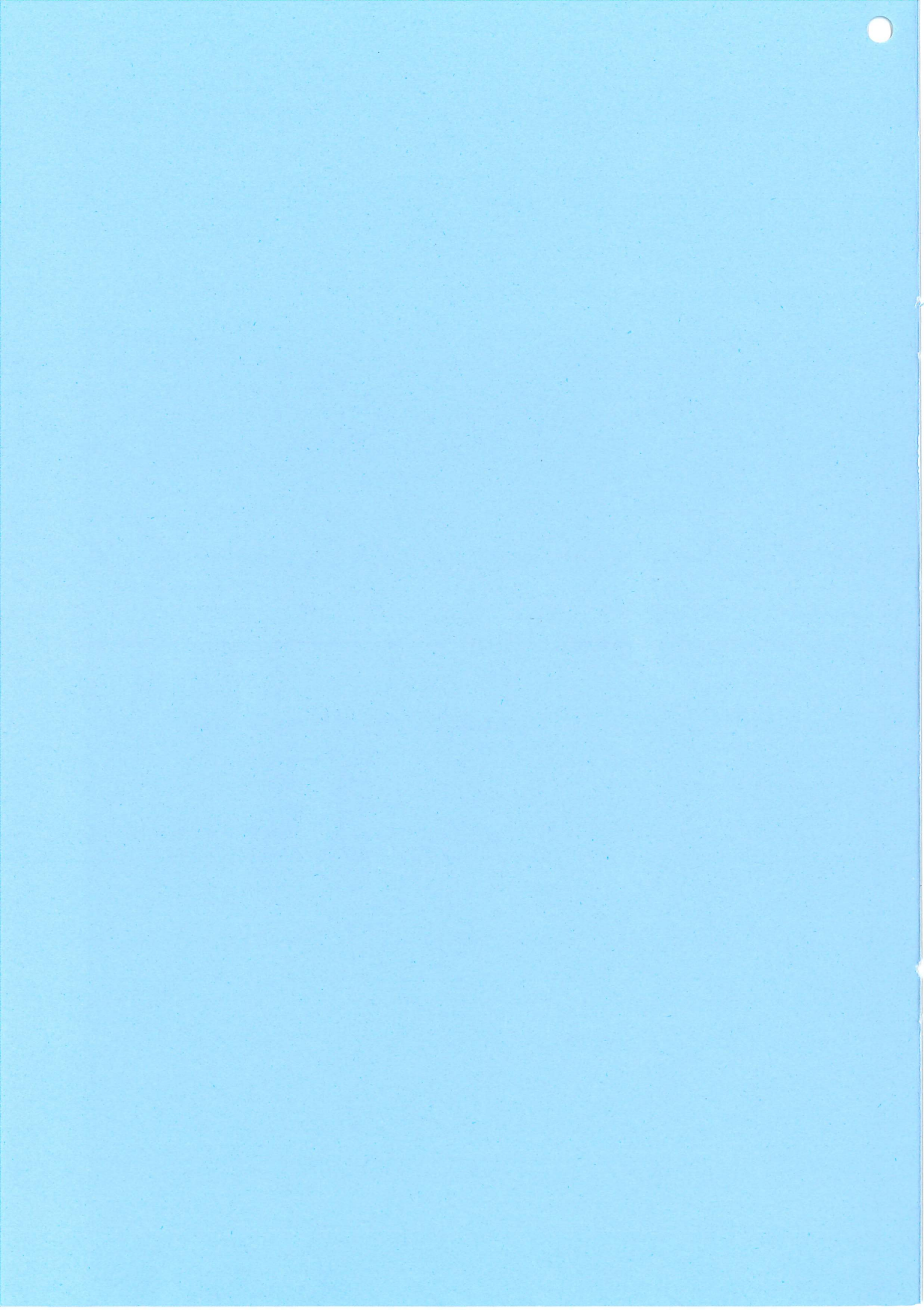
FORENAME(S): Vladyslav

## 12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

|   |                                  |   |
|---|----------------------------------|---|
| 7 | Number of Answer Books handed in | 1 |
|---|----------------------------------|---|

| List the numbers of the questions you have attempted | Office Use |
|------------------------------------------------------|------------|
| 1 a, b, c, d, e, f, g                                | 32         |
| 2 a                                                  | 18         |
| 3 a, b, c                                            | 12         |
| 4 a, b, c, d, e, f                                   | 14         |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
|                                                      |            |
| Total                                                | 76         |



## Decimal to Binary

1a a) 62 decimal to Binary.

Let's write a sequence of binary values, which is:

|     |    |    |    |   |   |   |   |
|-----|----|----|----|---|---|---|---|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 1   | 1  | 1  | 1  | 1 | 0 |   |   |

Answer: 111110. ✓ 3

|     |    |    |    |   |   |   |   |
|-----|----|----|----|---|---|---|---|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 1   | 1  | 1  | 1  | 1 | 0 | 1 |   |

Answer: 1111101. ✓ 3

## Binary to Base 10

1b a) 10011001:

$$128 \begin{array}{|c|c|c|c|c|c|c|c|} \hline 64 & 32 & 16 & 8 & 4 & 2 & 1 \\ \hline 1 & 0 & 0 & 1 & 1 & 0 & 0 & 1 \\ \hline \end{array} = 128 + 16 + 8 + 1 = 153 \checkmark \quad 3$$

Answer: 153<sub>10</sub>.

b) 11110:

$$128 \begin{array}{|c|c|c|c|c|c|c|c|} \hline 64 & 32 & 16 & 8 & 4 & 2 & 1 \\ \hline 1 & 1 & 1 & 1 & 0 & & & \\ \hline \end{array} = 16 + 8 + 4 + 2 = 30 \checkmark \quad 3$$

Answer: 30<sub>10</sub>.

1c

a) 2F

|               |    |    |    |   |   |   |   |
|---------------|----|----|----|---|---|---|---|
| Hex to Binary |    |    |    |   |   |   |   |
| 8             | 4  | 2  | 1  |   |   |   |   |
| 128           | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 0             | 0  | 1  | 0  | 1 | 1 | 1 | 1 |

F = 15

Answer: 00101111. ✓ 2

b) 36:

|     |    |    |    |   |   |   |   |
|-----|----|----|----|---|---|---|---|
| 8   | 4  | 2  | 1  |   |   |   |   |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 0   | 0  | 1  | 1  | 0 | 1 | 1 | 0 |

= 00110110

Answer: 00110110. ✓ 2

## Hex to decimal

1d a) C3:

|     |    |    |    |   |   |   |   |
|-----|----|----|----|---|---|---|---|
| 8   | 4  | 2  | 1  |   |   |   |   |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 1   | 1  | 0  | 0  | 0 | 0 | 1 | 1 |

C = 12

= 11000011 =

$$= 128 + 64 + 2 + 1 = 195$$

Answer: 195. ✓ 3

b) 66

|     |    |    |    |   |   |   |   |
|-----|----|----|----|---|---|---|---|
| 8   | 4  | 2  | 1  |   |   |   |   |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 0   | 1  | 1  | 0  | 0 | 1 | 1 | 0 |

= 01100110 =

$$= 64 + 32 + 4 + 2 = 102$$

Answer: 102. ✓ 3

1e

5 bit number 1286432168421

Answer: 17 x

0

1f

i) 4000 · 3000 (16 million colours)  
 12000000 · 1 megapixel = 1 million pixels  
 $\frac{12000000}{1000000} = 12$  megapixels.  
 Answer: 12 megapx.

3

ii) If compression 10:1 and file size is 36 MB, then:  $36/10 = 3,6$  MB.

3

Answer: 3,6 MB. ✓

1g

To download 36 MB file with speed 80 MB/s, it will take:

$80 \cdot 125 = 10000$  KB/s or 10 MB/s.

Then  $36/10 = 3,6$  seconds.

Answer: 3,6 seconds. ✓

4

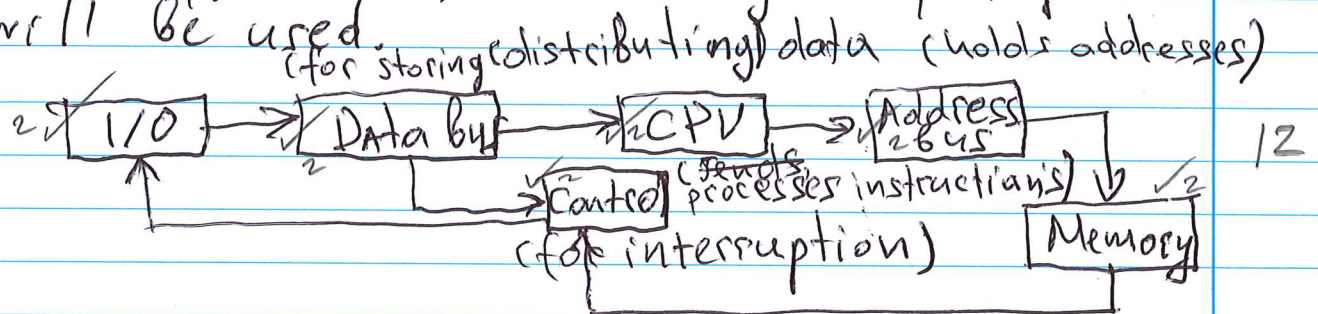
(32)

2a

Von Neumann architecture is presented on the picture. Let's consider the keyboard button press process as an example.

i) When the button is pressed it starts the way of the command from Input/Output Block, and then flows into Data Bus, where it will be moved to Central Processing Unit for formulation of the address and further instructions. When the command is sent to CPU it automatically at the same time sends interrupt which is generated by Control Bus to ensure that if the system has active processes, which have high priority, that they will not be

interrupted, and the system will wait until the process is completed, so it will not be interrupted by key press. CPU block sends the address to address bus, which will handle calls from the system. From address bus, the command goes to Memory block, where it will be stored in Random Access Memory, until Control bus gives a signal that it can be pulled through from the interruption queue and can be processed. From RAM the command goes back to Control bus, which further sends it to Input/Output block, where this time only Output part will be used.



This process is looped and can be used for other types of processes, such as store the text in RAM, etc.

- 3a Capacities of different storage devices:
- i) Double Layer DVD  $\approx$  4 GB.  $\times$  single  $\%$
  - ii) HDD £80 price  $\approx$  1 TB  $\times$
  - iii) A £100 M.2 SSD  $\approx$  1 TB  $\checkmark$

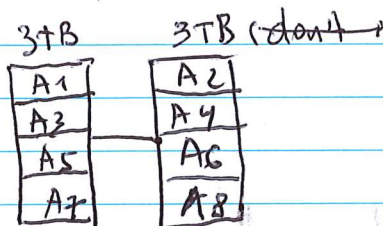
- 3b Data transfer rates for each device:
- i) M.2 NVME Read: 7000 MB/S Write: 6800 MB/S  $\checkmark$
  - ii) HDD: R: 150 MB/S W: 100 MB/S  $\checkmark$
  - iii) LAN port: up to 1000 MB/S (1 GB/S)  $\checkmark$

Given:

3C

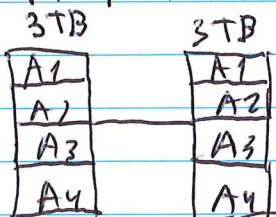
3TB hard drives.

1) Use RAID 0



Pros: Faster, could quickly restore damaged part of 3TB HDD, because it's only restores parts of HDD, not full drive.

11) Use RAID 1



Pros: Slower, but more reliable than RAID 0, more suitable for enterprises.

RAID 0 cons: Not reliable for big enterprises, because it stores information partially on each drive.

RAID 1 cons: Can be slow as it stores information of one hard drive on both drives. For example, if we have 3TB drive, we will need to have other 3TB drive to use RAID 1, or two drives with 1.5TB each. It means, that could be more expensive than RAID 0.

4

(12)

4

a) Intel Core i7 (8 cores)  $\approx$  £700

It is a fast and reliable processor, which is suitable for editing 4K videos. It is efficient, has good clock speed  $\approx$  3.6 GHz.

b) Corsair 16GB x2 RAM (32GB) (3200 MHz)  $\approx$  £400

32GB is a suitable RAM size for most of editing software. It is enough to quickly allow multitasking and use of multiple software for 4K video editing.

3

2

c) M.2 Kingston 2 TB £200 ✓

M.2 is the best option for non-volatile storage. In a modern market, there is no big difference between SSD and M.2 storages, but M.2 is 10x faster, which allows quickly save, move, edit big 4K video files.

2

d) Ports needed are: USB 3.0-3.1, SD slot (for cameras), HDMI or Display Port (for monitors), Audio Jacks (for headphones, microphones).

2

no justification

e) NVIDIA GeForce RTX 3090 £700

NVIDIA is a reliable graphics card, which allows users to perform heavy rendering in a short time. Mostly this GPU came with 16 GB of VRAM, which allows PC to handle high difficulty tasks, such as rendering of 4K videos.

3

f) Typical software for video-editing are: Adobe Premiere, Sony Vegas, Adobe After Effect, Movavi Video Editor, etc.

2

For professionals, the best software would be Adobe Premiere and Sony Vegas. For amateurs the best choice are Movavi Video Editor, or ShortCut.

(14)



Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn



Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn



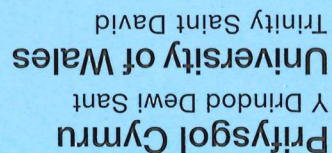
Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn





## 12 Tüdalen

## Cyfarwyddiadau i Ymgeiswyr

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plygwch ef a'i selio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llawysgrifen ddarllenadwy. Gall yr Arholwyr naill ai anwybyddu sgrïp annarllenedadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.

4. Vergleichen Sie die beiden Aussagen mit dem Text. Was ist die Meinung des Autors?

5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.

6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.

7. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwyr/gwyllwyr.

8. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchiadau.

|   |                                         |  |
|---|-----------------------------------------|--|
| 7 | Nifer y Llyfrau Atebion<br>a gyflwynwyd |  |
| 6 | Rhif Sedd                               |  |
| 5 | Lleoliad yr Arhollad                    |  |
| 4 | Dyddiad ac Amser yr<br>Arhollad         |  |
| 3 | Cod y Modwl                             |  |
| 2 | Teitl y Papur<br>Arhollad               |  |
| 1 | Rhif Myfyrwr                            |  |

[illegible]

(See the other side for English version)

**Llenwch, plygwh a seliwh**  
**(gweler nodyn 2 isod)**

**CYFENN:**

ENW(AU) CYNTAF: