

CLASS NOTES TO UNIT: TRANSISTORS (Video lesson + Class + Portfolio assignments)

In this unit we are going to:

- Hold a content-based simulated class (so as to deal with technical English in the most possible practical way, in context, and without stopping at linguistic issues), based on transistors, divided into: previous questionnaire (1), lecture (2) and discussion (3).
- Write a forum sequence of experts (4).

Parts 1-3 will be dealt with in the video lesson and in class, including exercises a and b. Part 4 must be done after the class and included in the students' portfolio

1. Questionnaire/ Exercise a: answer the following questions according to your own knowledge, without searching for further information. Read the introductory paragraph first:

Modern computers are revolutionizing our lives, performing tasks unimaginable only decades ago. This was made possible by a long series of innovations, but there's one foundational invention that almost everything else relies upon: the transistor. Gokul J. Krishnan describes what a transistor is and how this small device enables all the amazing things computers can do.

1. How are numbers represented in a modern computer?

- A Magnets
- B Display monitors
- C Mechanical arrangements
- D Electric voltages

2. An AND gate provides a high voltage output if:

- A Both inputs are low voltage
- B One input is high voltage and the other is low voltage
- C Both the inputs are high voltage
- D Either one or both inputs are high voltage

3. Why were vacuum tubes discarded?

- A They were bulky
- B They were unreliable
- C They used a lot of energy
- D All of the above

4. What material is used to fabricate a transistor?

- A Metals like copper and gold
- B Semiconductors like silicon
- C Superconducting materials
- D Insulators like plastic and glass

5. When does a transistor 'conduct'?

- A When voltage is applied between collector and emitter
- B When voltage lesser than threshold voltage is applied between base and emitter
- C When voltage greater than threshold voltage is applied between base and emitter
- D A transistor always conducts irrespective of voltages applied

6. How does a computer add two numbers? (open question): By...

7. How is a triode made? How could it control the flow of current through it?

8. Explain the construction of a transistor and how it switches currents. How does the transistor overcome the inefficiencies of the vacuum tube?

2. Lecture / Exercise b: let's watch the video; then, go back to the questionnaire and modify any answers if necessary, using a different colour:

<https://ed.ted.com/lessons/how-transistors-work-gokul-j-krishnan#watch>

After that, let's discuss the content of the video: students will define the concepts and explain the processes shown there in their own way.

3. Discussion: in class, we will discuss the following topic related with the previous exercises:

Modern transistors are already minuscule. Do you think that size reduction is still possible? Will Moore's law be obeyed forever, or is there a limit?

4. Written assignment for your portfolio: in class, we will read the following discussion sequence in a forum, based on the question formulated in exercise 3:

Participant 1

The limit is only passing once the quantum level, and even that is starting to be used at our advantage, but eventually there will have to be a limit until the chips become bigger, which is an option as well.

Participant 2

the limit has already been passed.

Participant 3

I think that the size of the transistor can actually get smaller to the point where it can be human movable and manipulable, that should be the limit, but if they make smaller it will be better so we can smaller devices. Smaller is always better.

Participant 4

I've read on a scientific website that the moore's law can't be applicable forever. This is true because the companies are starting to focus on creating devices with less energy consumption, what will decrease their performance.

Now, think of another possible question about the same topic for a similar forum, and introduce at least 4 entries from 4 possible participants. These must give different points of view about the issue discussed whenever

possible. You can try to find inspiration in the forum questions available, but do not copy/paste any ideas or entries. Approx. length: 120-150 words.