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| **Industrial electronics (2Hrs/week)** |

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***Chapter 1*: Semiconductor Junctions (2h)**

1.1- Definition of the semiconductor.

1.2- Intrinsec semiconductor.

1.3- N and P Doped Semiconductor.

1.4- PN junction; structure potential barrier.

1.5- Courant-voltage characteristic I = f (v)

1.6- Applications of the PN junctions.

***Chapter 2:* The diode and zener diode (4h)**

2.1- The diode:

2.1.1- Definition, structure, symbol, and equivalent circuit.

2.1.2- Principle of operation in forward and reverse bias.

2.1.3- Characteristic curves I= f (V) in forward and reverse bias.

2.2- The zener diode:

2.1.1- Definition, structure, symbol, and equivalent circuit as battery and battery in series

with its internal resistance.

2.1.2- Principle of operation in forward and reverse bias.

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***Chapter 3*: The thyristor (4h)**

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3.2- Operation: Conduction and blocking laws (thyristors ; GTO).

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3.4- Gate command circuits.

3.5- Applications: controlled rectifiers.

***Chapter 4 :* The triac (2h)**

4.1- Definition, structure, symbol, and equivalent circuit.

4.2- Operation: Conduction and blocking laws.

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4.4- The modes of operation of the triac.

4.5- Applications: Utilization of the triac as a power regulator or dimmer: Role, circuit, principle of operation and waveforms.

***Chapitre 5:* The diac (2h)**

5.1- Definition, structure, symbol, and equivalent circuit.

5.2- Operation: Conduction and blocking laws, impedance of the diac in the conduction and blocking cases.

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***Chapitre 6:* The unijunction transistor UJT (2h)**

6.1- Structure, equivalent circuit and symbol.

6.2- Operation of the UJT: The equivalent circuit in both cases when UJT is ON.

6.3- The characteristic curve of the UJT: VE = f (IE).

6.4- Applications:

1- Oscillator circuit with unijunction transistor: Role, principle of operation, waveforms.

2- Relaxation oscillator with unijunction transistor used as pulse generator: Role, circuit, principle of operation, waveforms.

***Chapter 7:* The programmable unijunction transistor PUT (2h)**

7.1- Structure, equivalent circuit and symbol.

7.2- Principle of operation of the PUT.

7.3- The characteristic curve of the PUT: V = f (I).

7.4- Comparing between UJT and PUT.

7.5- Application: Relaxation oscillator circuit with PUT used as pulse generator: Role, principle of operation, waveforms.

***Chapter 8:* The AC/DC converters or rectifiers (2h)**

**-** Single phase rectifiers:

9.1- Four diodes bridge.

9.1- Four thyristors bridge (reversibility).

9.1- Combined bridge two diodes and two thyristors (non reversibility).

***Chapitre 10:* The DC/DC converters (2h)**

10.1- Role, Principle.

10.2- Serial basic converter: Role, circuit, principle of operation, waveforms and utilizations.

10.3- Parallel basic converter: Role, circuit, principle of operation, waveforms and utilizations.

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***Chapitre 11:* The DC/AC converters (2)**

11.1- Role, Principle.

11.2- Single phase DC/AC converter with two thyristors or power transistors and a center tap transformer: Role, circuit, principle of operation, waveforms and utilizations.

11.3- Single phase DC/AC converter with bridge of four thyristors or power transistors :Role, circuit, principle of operation, waveforms and utilizations.