

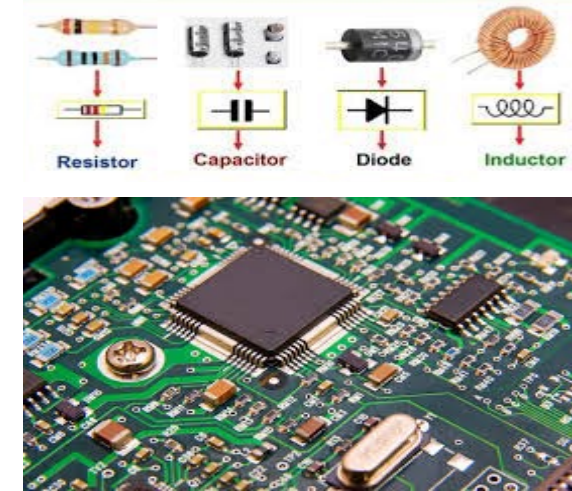


# Electronics 1

BSC 113

Fall 2022-2023

Lecture 12



# Full Wave Rectifier (FWR) Introduction to BJT and FET

**INSTRUCTOR**

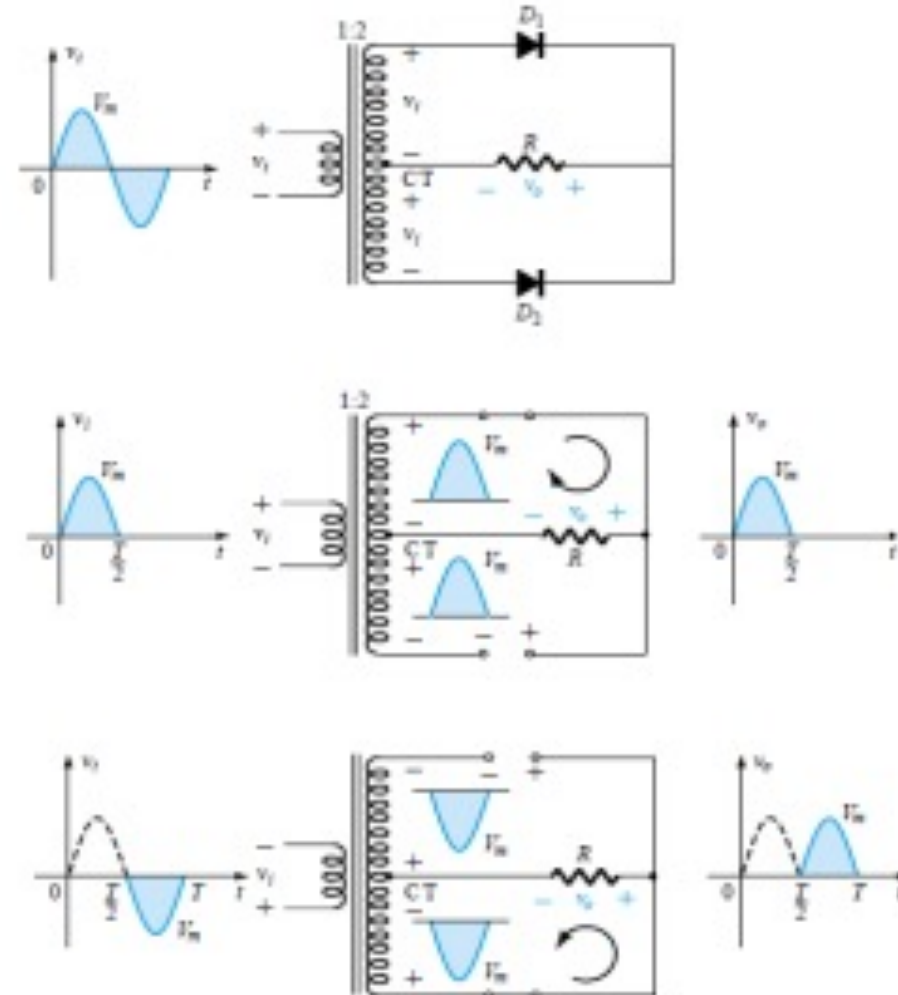
DR / AYMAN SOLIMAN

## ➤ Contents

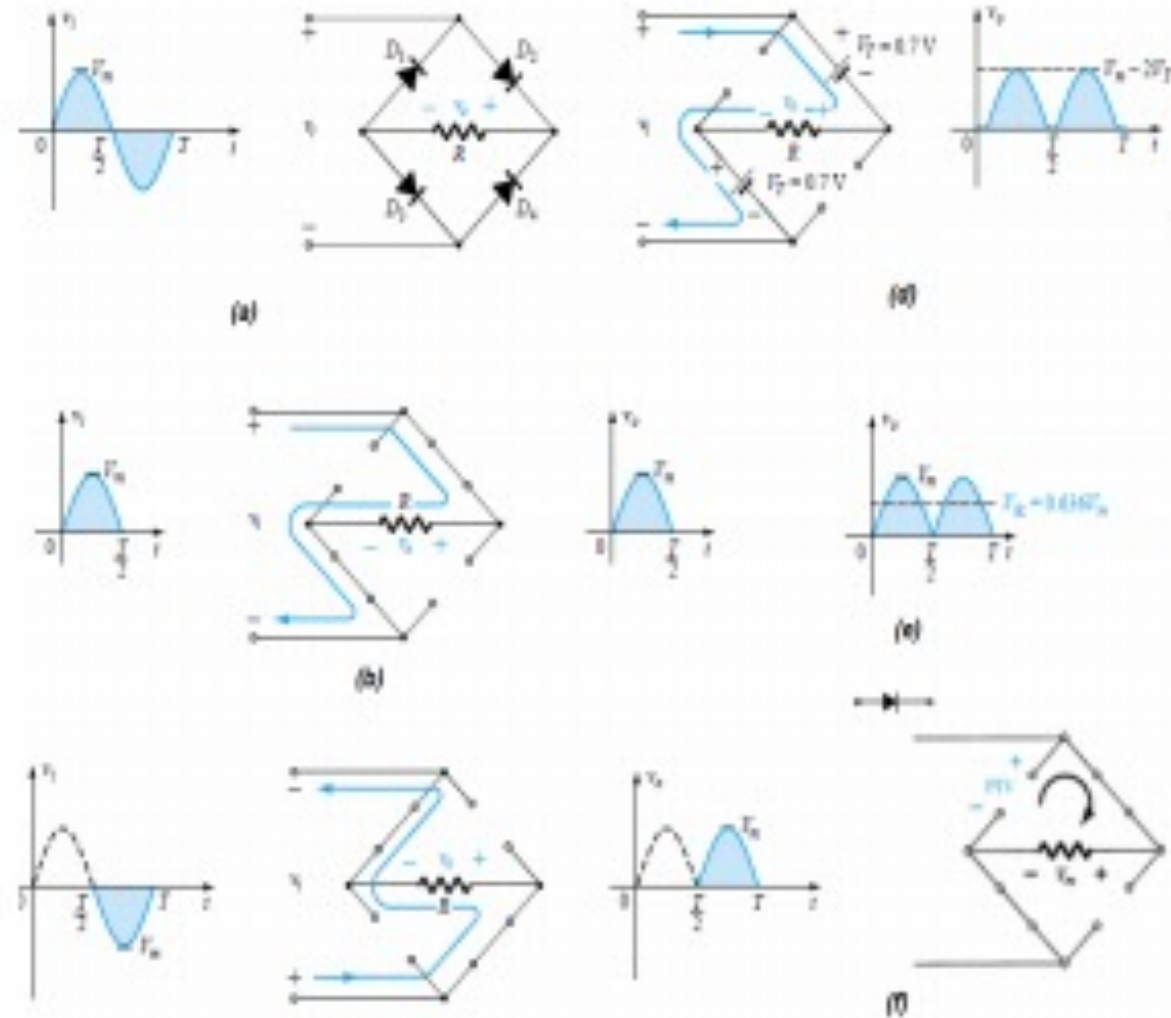
- 1) Center-Tapped transformer FWR
- 2) Bridge FWR
- 3) Introduction on BJT
- 4) Introduction on FET

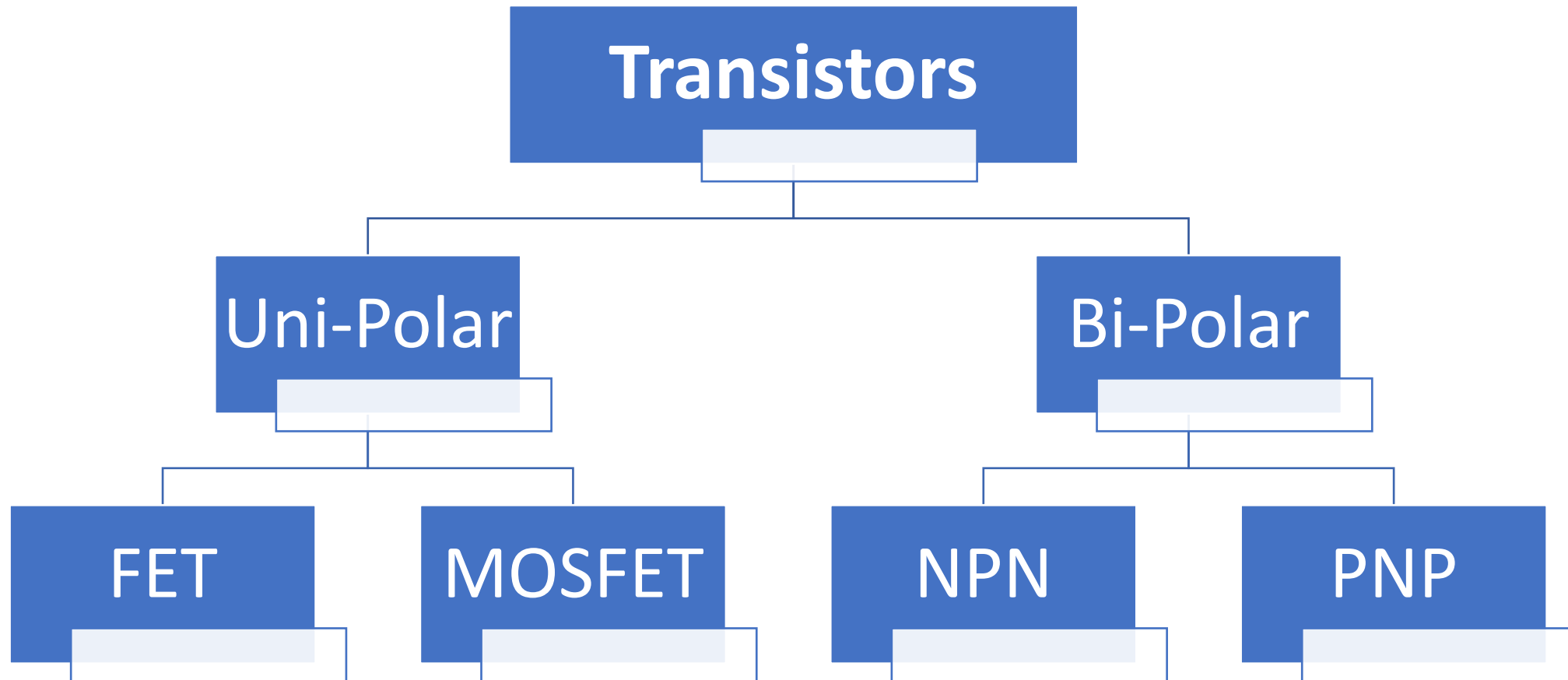


# ❑ Center-Tapped transformer FWR



# □ Bridge FWR





## □ BJT

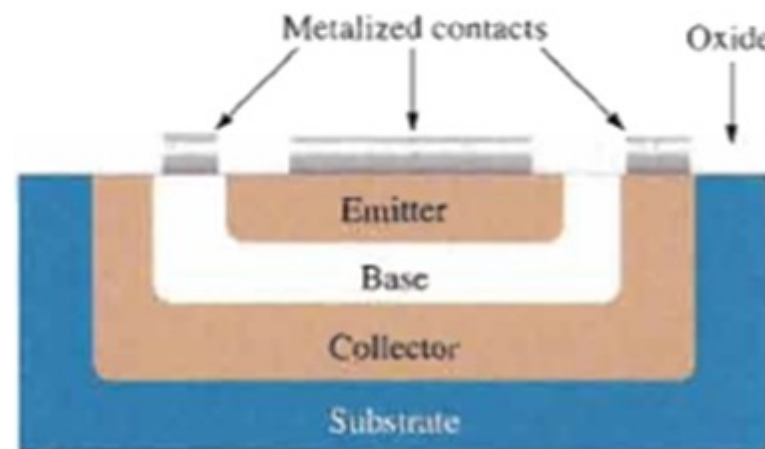
### ➤ BJT definition

we can describe the BJT as the following points:

- ✓ The BJT is an abbreviation for Bipolar Junction Transistor
- ✓ The BJT contains from three types of semiconductor material (2N&P or 2P&N)
- ✓ The BJT contains three terminals ( Emitter (E) – Base (B) – Collector (C))
  
- ✓ Note that the base doping is slightly than another terminal

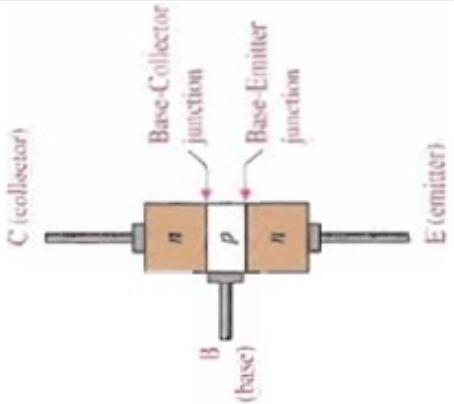
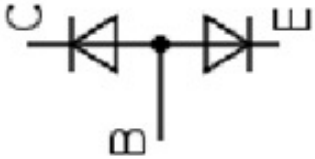
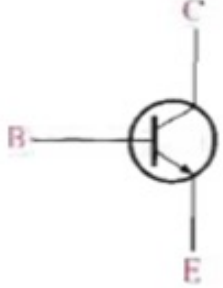
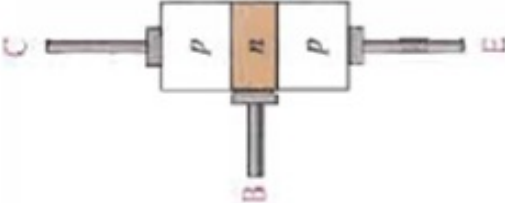
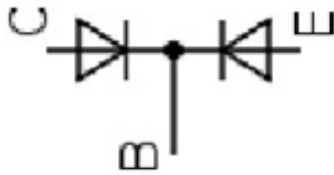
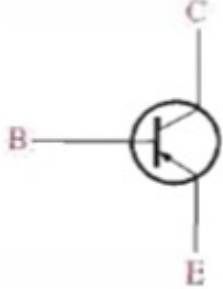
## □ BJT

- BJT construction, model, and symbol
  - ✓ The planar structure for BJT is shown in figure.
  - ✓ The main two types of BJT are NPN and PNP.
  - ✓ We can obtain the difference between graph construction, modeling and symbols for these types as shown in next table



# □ BJT

➤ Table 1 : the BJT graph construction, modeling and symbols

BJT types	Constructions	Models	Symbols
NPN			
PNP			



## □ BJT

### ➤ BJT operations

As shown in the previous subsection any BJT contains from two diodes with two junctions which called BCJ between base and collector, and BEJ between base and emitter.

According that we can classified operations and applications of BJT as shown in next table

<b>BEJ</b>	<b>BCJ</b>	<b>Operation mode</b>	<b>Application</b>
<b>Forward bias</b>	<b>Forward bias</b>	<b>Saturation</b>	<b>Switch on</b>
<b>Forward bias</b>	<b>Reverse bias</b>	<b>Active</b>	<b>Amplifier</b>
<b>Reverse bias</b>	<b>Forward bias</b>	<b>Reverse Active</b>	<b>Digital electronics</b>
<b>Reverse bias</b>	<b>Reverse bias</b>	<b>Cutoff</b>	<b>Switch off</b>

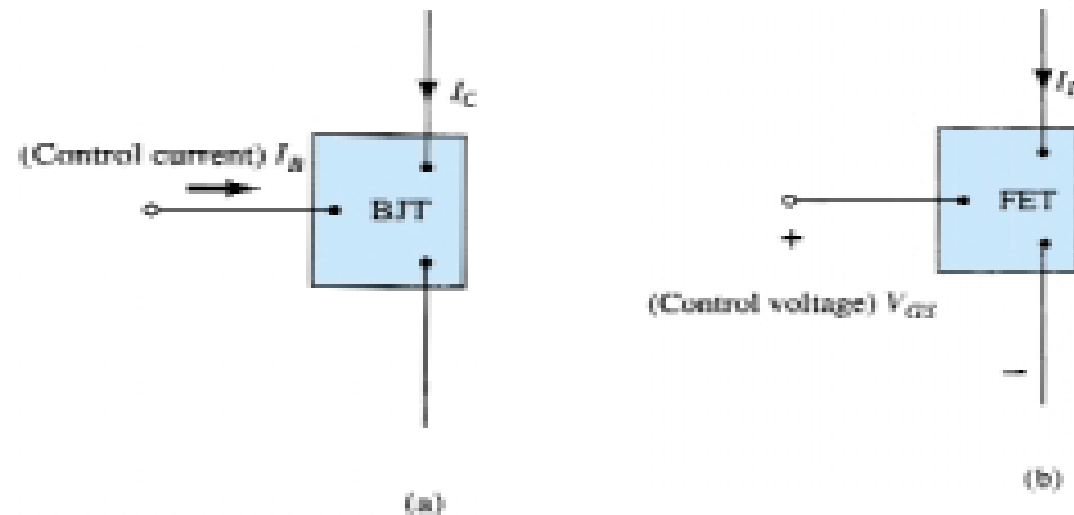
# □ FET

## ➤ FET overview

### FET definition

FET is uni-polar device which means that the operation depends on only one type of charge carriers ( h or e).

It is a voltage-controlled device which means that the gate voltage controls drain current.



# □ FET

## ➤ FET properties

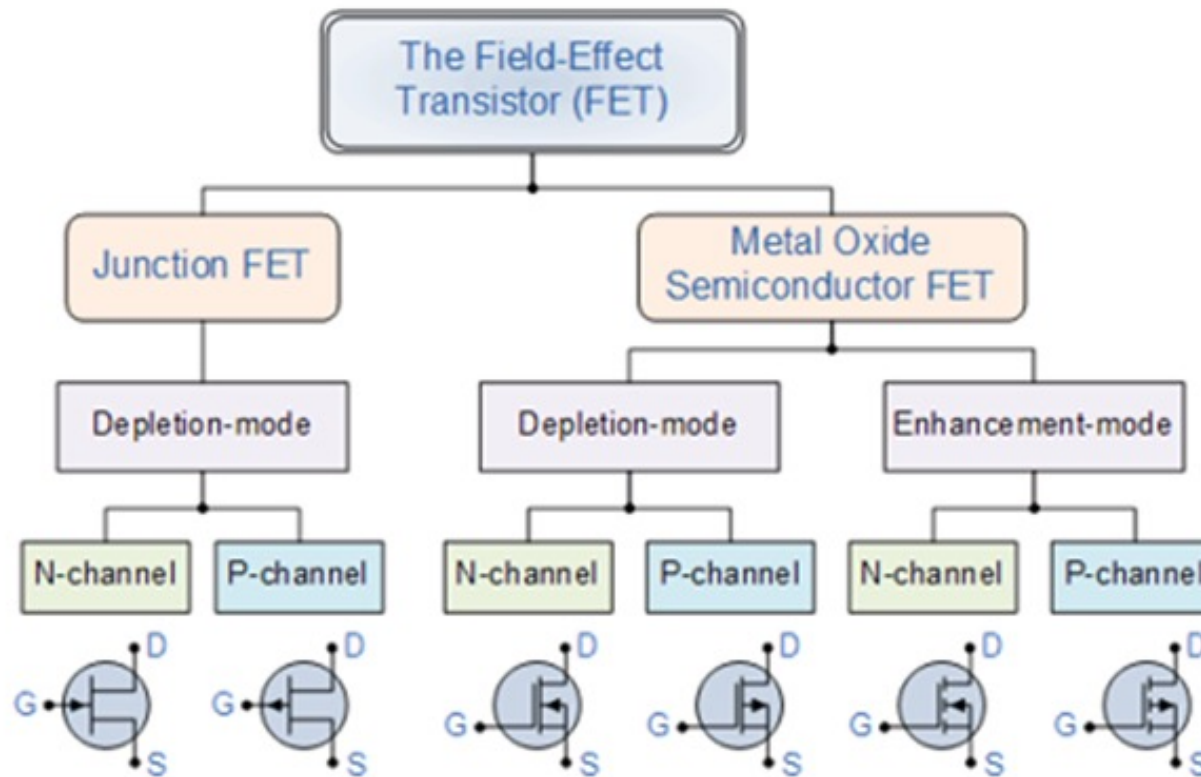
FET have many advantages over than others transistors as the following:

- Unipolar device. Its operation depends on only one type of charge carriers (h or e)
- Voltage controlled Device (gate voltage controls drain current)
- Very high input impedance ( $\approx 10^9 - 10^{12} \Omega$ )
- Source and drain are interchangeable in most Low-frequency applications
- Low Voltage Low Current Operation is possible (Low-power consumption)
- Less Noisy as Compared to BJT
- No minority carrier storage (Turn off is faster)
- Self limiting device
- Very small in size, occupies very small space in ICs
- Low voltage low current operation is possible in MOSFETS
- Zero temperature drift of output is possible

# □ FET

## ➤ FET classification

classification of FETs with their symbols can be shown in figure



*Thank  
you*

