Indian Institute of Science

Design of Photovoltaic Systems

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NPTEL Online Certification Course

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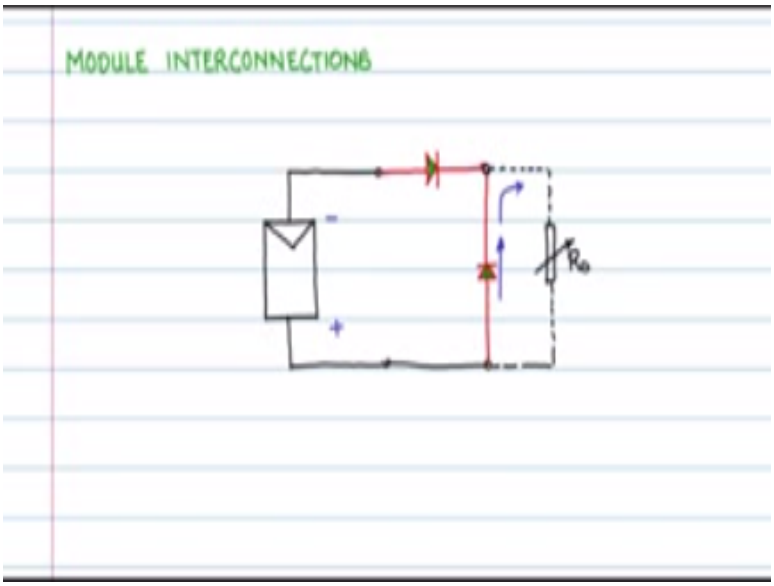

Let us look at some module inter connections, if you take a typical module of a PV cells it is like this and it has its terminals, so to this we need to add the diodes. So one of the diodes that we need to add is across the terminal like this, now this is the diode which will become effective whenever this module is connected in series and if it is having partial shading this may go into the shrinking mode at which time this diode will bypass this panel and protect it. Another diode you need to add like this and the terminal now supposed to get connected to the external load will be here.

So this is where you have to connect the external load or not like this, so this diode is for series protection and this diode is for parallel protection. When the panel is in the sinking mode dissipative mode, the polarity will be like, this diode will be active and you will have the current flow like that. So you actually will have both the diode drops coming into picture across the

terminals, in order to say one of the diode drops you may find in literature this diode instead of being placed here will be placed here.

So it will bypass this panel along with a series diode set, you can also place the bypass diode in this fashion where you will have only one diode drop whenever the current is flowing through the bypass diode in this fashion.

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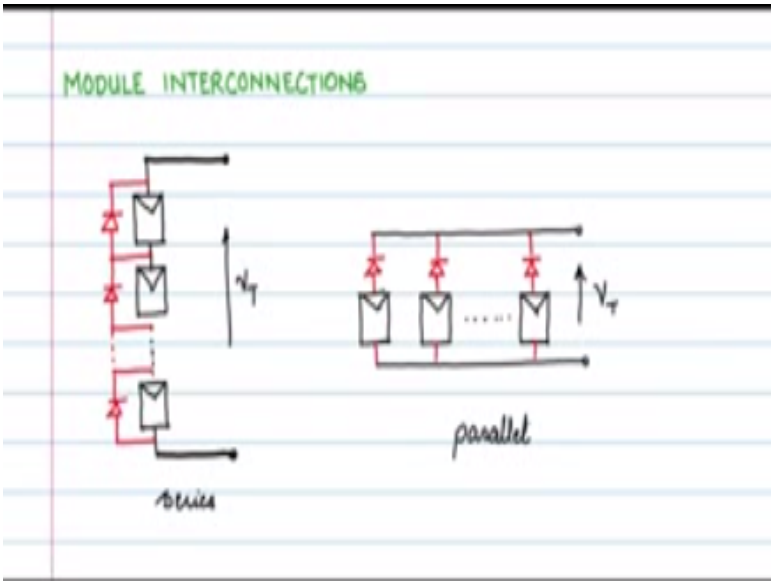

When we have many modules connected in series it will look like, this drawing it quickly, so let us say you have many such modules and all these modules you want to connect in series like that and we know that we just connect diodes across like this, such that they will be able to bypass the PV panels in case they go into partial shading syncing mode. So this would be the terminals and you will have wheat the terminal voltage across which you can connect the load. Now this way you can have a string of modules in series like that. You can also have many modules in parallel.

So let us say I have n modules in parallel like this and we can connect external diodes in series like this, such that it blocks any reverse current flowing into the panels. So this would the set of modules in parallel you could also have series auto-configuration, so this is a series this is parallel.

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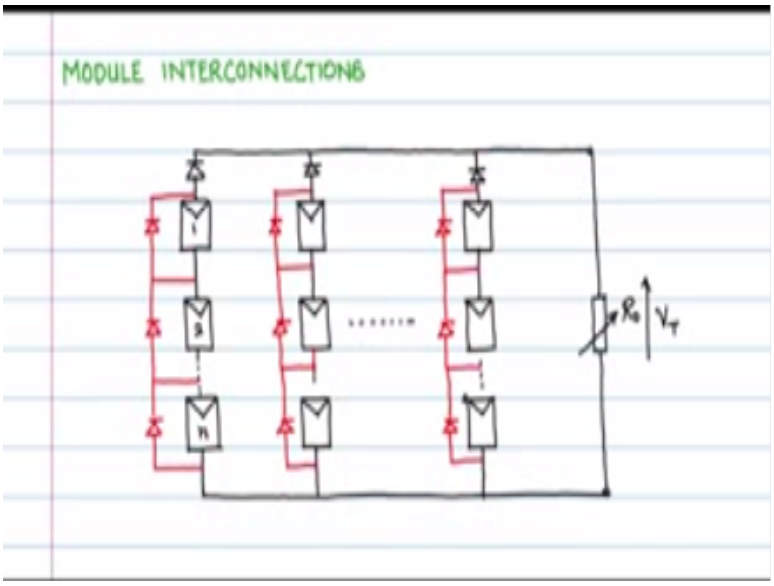

Let us interconnect a big system with modules in both series and parallel, now let us say you have m modules in series like this, so this is 12 n, let me put a series diode like this for the entire series are like this, so each of the theories arm is having one series diode and there are M parallel sets and for bypass protection you have diodes across each of the modules like this or you can have even for group of modules set of diodes. Connect the diodes like this across, now this will give the series sync effect protection for every module and then interconnect all the series arms in this fashion.

So there are many such arms and here you will have your load, this is or not and voltage across that is VT. So this will be a generic system where you have n modules in series like this and there are M sets so is 1, 2 so on M set. So you have N by M modules and they are protected in this fashion.