

**SEE 4433/SEM 4413: Power Electronics and Drives: Dr. Zainal Salam  
DESIGN No.3**

**Posted on website: 10/08/2002 (Saturday)**

**Due Date: 22/08/2002 (Thursday)**

**1.0 The Problem**

Design a “variable voltage, variable frequency (VVVF)” inverter with the following specifications:

1. The supply is a three-phase ac, at 240V rms/50Hz per phase.
2. The output of the inverter is single-phase ac with frequency that can vary from 10Hz to 150Hz. The amplitude of output voltage can vary between 50V to 200V rms.
3. Assume load is fixed at 100R.
4. Total voltage total harmonic distortion should be 8% or less in all conditions.
5. No transformer is allowed.

The basic design needs to be clearly shown on paper. But since it is a rather complicated system, I’m suspecting that most of the work needs to be simulated using PSpice. You must show me the design works in all conditions, i.e. in all conditions ALL the specs must be fulfilled.

**3.0 Report.**

This is the product of your work. A report is due on Thursday (22<sup>nd</sup> February 2002). As usual, late submission will be penalized per day basis (20% downgraded per day). The format of the report is as follows:

- i) Designer Name(s), Date, Title, Objective
- ii) Design philosophy
- iii) Hand calculation and Pspice simulation
- iv) Discussion and Conclusion.
- v) Signature

In your report you need to show, among others, the unfiltered PWM waveform output, the filtered PWM output. FFT of the unfiltered and filtered PWM output must also be shown.

The report is NO MORE than 15 pages long, inclusive of diagrams, with 1 ½ spacing in-between lines. Since this design carries the weight of two tests, a lot of thing is on the wire for you. Be careful.