

Hanoi University of Science and Technology School of electrical engineering	Final Examination: Power electronic EE3410E Exam paper code: 02 Examination time: 90 Minutes Date: 04/09/2021	Lecturer Signature Nguyễn Kiên Trung
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Question 1 (1P): Why is high frequency switching preferred in modern power converter? How to reduce the switching power loss in the high frequency converter?

Question 2 (1P): What is a solid state relay (SSR)? Explain the topology and basic operation principle of a single phase SSR. What is advantage, disadvantage, and application of SSR?

Question 3 (3P): Design converter with the parameters as following:

- Input : 12VDC \pm 15%
- Output voltage: 5VDC \pm 2%
- Output power: 10 W
- Switching frequency: 100 kHz

Question 4 (3P): Design a PWM single phase full-bridge inverter with the parameters as following:

- Output voltage: 220V RMS/ 50Hz;
- Output power: 1150VA;
- PWM frequency: 10 kHz

Question 5 (2P): The three phase inverter control by SVM method with the parameters as following:

- Input DC voltage: 540V
- Three phase load: $Z_a=Z_b=Z_c=10+10j$, in Star Connection (Y).
- Switching frequency: 10 kHz
- Output voltage fundamental frequency: 50Hz

Output voltage vector: $U_0 = 150e^{j\theta}$, $\theta = 2\pi * 50 * t$ (rad). Calculate the applied time for each vector when the $\theta = 75^\circ$. Sketch the control pulse waveform for each switching device in this case.