Reg. No.



II SEMESTER M.TECH (PED) END SEMESTER EXAMINATIONS,

APRIL - MAY 2017

SUBJECT: ADVANCED POWER ELECTRONIC CONVERTERS [ELE 5222]

REVISED CREDIT SYSTEM

Time: 3 Hours	Date: 29, April 2017	Max. Marks: 50
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Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- **1 A.** Assuming Continuous Conduction, realize the switches in the Fig Q1A. using transistors and/or diodes. The switch is first closed at position 1 and after sometime it is transferred to position 2. The switching is periodic.



Fig Q1A.

(05)

(05)

(05)

(05)

- **1 B.** A 12V, 15W load is to be powered from a DC source whose input voltage is in the range of 5V to 15V. Design the converter to interface the load to the source. Draw the circuit diagram.
- **2 A.** Draw the circuit diagram of a buck converter (Consider a non-ideality of Inductor Copper Loss). Sketch the graph of converter gain versus duty ratio. Obtain the expression of efficiency and sketch the efficiency versus duty ratio.
- 2 B. Draw a circuit diagram, relevant waveforms and explain the working of an Isolated Full Bridge (Buck Derived) Converter. (05)
- **3 A.** Explain the steps involved in designing an Inductor.
- 3 B. Derive the expression of converter gain (Ratio of output voltage to input voltage) of a boost converter operating in discontinuous conduction mode. Derive an expression that can be used to check whether the operation is in continuous conduction mode or discontinuous conduction mode. (05)
- Derive the small signal model of a buck converter using state space averaging technique.
 From the small signal model Obtain the transfer function of output voltage expressed as linear combinations of its various input and control parameters. (10)
- **5 A.** Explain the steps involved in design of a lead compensator for a buck converter. (05)
- **5 B.** Explain the reason behind switching losses. What is the relationship between switching losses and switching frequency. Explain the fundamental principle of ZCS and ZVS. *(05)*