Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

## **I SEMESTER M.TECH (POWER ELECTRONICS & DRIVES )**

## **END SEMESTER EXAMINATIONS, NOVEMBER 2017**

## SUBJECT: MODELING and ANALYSIS of POWER-ELECTRONIC SYSTEMS and ELECTRICAL MACHINES [ELE 5123]

REVISED CREDIT SYSTEM

Time	: 3 Hours	Date: 23 November 2017	Max. Marks: 5	50
Instructions to Candidates:				
	<ul> <li>Answer ALL the questions</li> </ul>	3.		
	<ul> <li>Missing data may be suital</li> </ul>	bly assumed.		
1A.	Derive the expression of Indu Converter in Continuous Condu	ctor Current Ripple and Capacitor Voltage Ripple action Mode	e for a Buck <b>(0</b> 4	4)
1B.	Derive the expression of the e	fficiency of a boost converter. Consider the MOSF ot the Efficiency vs Duty Ratio for any one value of	ET On State Tload. (06	6)
2	Derive the small signal model or voltage as a linear combination	f the buck converter and obtain the transfer functi of various inputs. Use a suitable technique.	on of output (10	0)
3A.	Derive the expression of Field Energy and Torque of an electromechanical system with two coils carrying current $i_1$ and $i_2$ .		em with two (05	5)
3B.	A toroid core has a diameter of 2cm. The cross sectional area is 10mm <sup>2</sup> . Two coils are wound on the core. Coil A has 500 turns and carries a current 10mA. Coil B has 750 turns and carries a current of 15mA. Determine the Magnetizing Inductance of Coil A, Mutual Inductance between Coil A and Coil B and the Flux Linkage of Coil B. Relative permeability of the core is			
	800.		(05	5)
4.	Derive the electromechanical stationary reference frame from	model of a two phase Induction machine (d-q) in n the basic principles. Discuss assumptions made.	the pseudo (10	0)
5A.	Explain the classification of Pow Give example for each category	ver Semiconductor Switches in the four quadrants . 7.	of V-I Curve. <b>(0</b> 5	5)
5B.	Derive the dynamic model of a s Model.	separately excited DC Motor from the Two Phase (d	-q) Machine <b>(05</b>	5)