

# APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

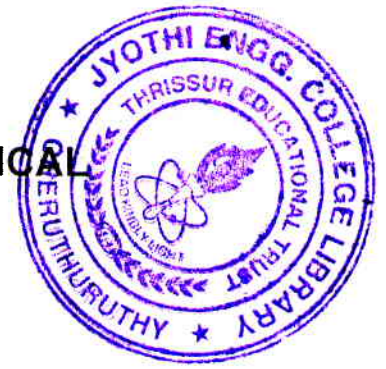
08 PALAKKAD CLUSTER

Q. P. code :

(pages: 2 )

Name:

Reg No:



FIRST SEMESTER M.TECH. DEGREE EXAMINATION DEC 2015

POWER ELECTRONICS

Subject id:  
08EE6251(B)

DYNAMICS OF ELECTRICAL MACHINES

Time:3 hours

Max.marks: 60

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1.a	Explain the concept of generalized machine model.	3
	<b>Answer b or c</b>	
b	Derive the torque equation of a generalized machine.	6
c	What is meant by Power Invariance? Explain the transformation from a 3 phase rotating axes to 2 phase rotating axes.	6
Q.no.	Module 2	Marks
2.a	What are the applications of dc compound generators?	3
	<b>Answer b or c</b>	
b	With relevant equations explain the characteristics of dc shunt and series machine.	6
c	State and explain Park's transformation for a 3 phase induction machine.	6
Q.no.	Module 3	Marks
3.a	Derive the transfer function of a separately excited dc generator at no load.	3
	<b>Answer b or c</b>	
b	Explain the steady state and transient analysis of a separately excited dc motor.	6
c	Derive the expression for armature current when a sudden short circuit appears across the armature terminals.	6

Q.no.	Module 4	Marks
4.a	What is meant by two reaction theory?	3

**Answer b or c**

- |   |   |   |
|---|---|---|
| b | With a neat phasor diagram explain the steady state analysis of a salient pole synchronous machine. | 6 |
| c | Derive the transient power angle characteristics of a 3 phase synchronous machine.                  | 6 |

Q.no.	Module 5	Marks
5.a	Draw the power flow diagram of an induction machine.	4

**Answer b or c**

- |   |  |   |
|---|--|---|
| b | With relevant equations obtain the torque slip characteristics and power slip characteristics of a 3 phase induction machine.  | 8 |
| c | A 3 phase star connected 400V 50 Hz 4 pole induction motor has the following constraints in $\Omega$ /phase referred to stator. $r_1 = 0.15$ , $x_1 = 0.45$ , $r_2 = 0.12$ , $x_2 = 0.45$ , $X_m = 28.5$ . Neglect core loss. Fixed loss = 400 W. Compute the rotor current and torque at starting, maximum torque and efficiency at a slip of 4%. | 8 |

Q.no.	Module 6	Marks
6.a	What is meant by slip power recovery scheme.	4

**Answer b or c**

- |   |  |   |
|---|--|---|
| b | Explain the concept of vector control of induction machine.  | 8 |
| c | Draw the generalized model of a single phase induction motor and derive the expression for torque. | 8 |