Reg.No. _____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14EE3007
Sub. Name : Generalized Theory of Electrical Machines

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Generalize the voltage equations for Kron's Primitive machine in matrix form and identify the observations are made from the impedance matrix of this machine?	CO1	14
	b.	Originate an expression of transformer voltage and speed voltage in the armature of an electrical machine.	CO1	6
		(OR)		
2.	a.	Formulate an expression for the electrical torque of the Kron's Primitive machine. Show that no torque is produced by interaction between the flux and current on the same axis.	CO1	20
3.	a.	A three phase Induction motor has the following per phase parameters referred to stator: Stator resistance ---- 0.30 ohm Rotor resistance ---- 0.45 ohm Stator and rotor leakage reactance ---- 2.1 ohm each Magnetizing reactance ---- 30.00 ohm Calculate the parameters of an equivalent 2-phase Induction motor if it's per phase turns are: i. same as that of the 3-phase Induction motor. ii. 3/2 times that of the 3-phase Induction motor. iii. √3/2 times of the 3-phase Induction motor	CO1	20
		(OR)		
4.	a.	In order to ensure power invariance in transforming one set of variables to another, show that the transpose of the transformation matrix should be equal to its inverse.	CO1	10
	b.	Demonstrate the term 'Linear transformation' as used in electrical machines? Illustrate your answer with suitable examples.	CO1	10
5.	a.	The separately excited d.c. generator running at 4500 / π rpm, has the following parameters: r_f = 80 Ω; L_f = 40 H; r_a = 0.1 Ω; L_a = 0.3 mH; Motional Inductance M_d = 0.8 H; (or generated e.m.f constant K_g = Md ώr = 120 volts / field amp) a. The field is unexcited and the armature is open. Find the armature voltage as a function of time and sketch it, if a constant voltage of 160 volts is suddenly impressed across the field terminals. b. Dramatize the rise of armature current in part (a), if the armature terminals are initially short circuited. c. Armature voltage has attained steady value in part (a). Now the armature is suddenly connected to a load of resistance 1.1 Ω in the series with an inductance of 1.7 mH. Conclude (i) armature current and (ii) the armature terminal voltage as functions of time.	CO2	20

		d. In part (c), calculate the electrical torque as a function of time. Obtain the mean value of torque also.		
		(OR)		
6.	a.	Paraphrase the principle of regenerative braking and counter current braking of d.c.motors	CO2	20
7.	a.	Develop the three phase induction machine stator and rotor voltage, flux linkages, torque equations in terms of arbitrary qdo reference frame.	CO3	20
		(OR)		
8.	a.	Investigate the Stator transient inductance of three phase induction machine in detail.	CO3	14
	b.	Draw the relationship between abc and arbitrary qdo reference frame of Induction machine.	CO3	6
		Compulsory:		
9.	a.	Explain in detail about the steady state operation of Synchronous machine.	CO2	10
	b.	Develop the sub-transient Inductance of Synchronous machine.	CO2	10

ALL THE BEST