Student Exam No:-_____

GANPAT UNIVERSITY
M.TECH SEM-I ELECTRICAL ENGINEERING
REGULAR EXAMINATION JAN-2013
3EE104:-ADVANCED ELECTRICAL MACHINES

Time: 3 Hours   Total

Marks:-70

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

Que-1 (a)   A 4/2 SRM have following dimensions :   [06]
Stator and rotor pole angle $\infty=\beta =60°=\Pi/3$rad,Air-gap length g=2.54×10^{-2}
cm ,Rotor outer radius R=3.8 cm, Active length D = 13.0 cm and the poles
of each phase winding are connected in series with total turns N = 100 in
each phase winding.(a) Plot the phase-1 inductance $L(\theta m)$ profile neglecting
leakage and fringing fluxes,(b) Plot the torque, assuming (i) $i_1=I_1$ and $i_2=0$
and (ii) $i_1 = 0$ and $i_2 = I_2$ (c) Calculate the net torque (in N. m) acting on the
rotor when both windings are excited such that $I_1= I_2 = 5$ A and at angles
(i) $\theta m = 0°$ (ii) $\theta m = 45°$.

(b)   Justify "The stator and rotor poles of a switched reluctance motor are not   [06]
same". Also discuss the merits and demerits of SRM.

OR

Que-1 (a)   List out the various power converters used for SRM and Explain one of them   [06]
with waveforms.

(b)   Draw and explain inductance profile of SRM and discuss about the current   [06]
drawn and torque developed in SRM with the help of inductance profile.

Que-2 (a)   Discuss the power curve of wind turbine generator and Compare DFIG with   [06]
synchronous generator.

(b)   Discuss the modeling of PMBLDC and obtain an equivalent circuit with the   [05]
generic equation for it.

OR

Que-2 (a)   Draw the Torque - Speed characteristic of PMBLDC.   [04]

(b)   Explain how conventional Brushed DC machine differ from BLDC machine   [07]
and discuss the important types of BLDC machines.

Que-3   **Attempt any two.**   [12]

(a)   Explain the application of PMBLDC in detail.

(b)   Explain Torque- Speed characteristic of Switched Reluctance Motor.

(d)   Discuss the double output Induction generator with voltage source Inverter.

Que-4 (a) Discuss the important applications of stepper motor with the help of any computer Peripheral. [06]

(b) Define (i)Step Angle (ii) start-stop mode, (iii) rotor Intria, (iv) pull-in-torque (v) pull-out torque (vi) slewing mode(vii) Detente torque for stepper motor [06]

OR

Que-4 (a) Explain construction and working of hybrid stepper motor. [06]

(b) Discuss the comparison between VRSM , PMSM and Hybrid Stepper motor. [06]

Que- 5 (a) What is significance of transformation equations in a reference frame theory? Obtain $P_{qdos} = P_{abcs} = 3/2 \ (V_{qs}i_{qs} + V_{ds}i_{ds} + 2V_{os}i_{os})$ [06]

(b) Explain recent trends in condition monitoring. And discuss fault detection and diagnosis technique for transformer. [05]

OR

Que- 5 (a) Determine the expression for f_{qdos} from f_{abcs} system having $f_{as}=\sin(\pi/2 - t)$, $f_{bs}= t/2$ and $f_{cs} = \cos(\pi/2 + t)$ where $\theta(0) = (-\pi/12)$, $\omega = 1$ rad/s and t=$\pi/3$ s. [06]

(b) Write short notes on modern discharge detection techniques used for the rotating electrical machines. [05]

Que-6 **Attempt any two.** [12]

(a) What do you mean by condition monitoring ?Discuss essential elements in condition monitoring system.

(b) Explain torque angle characteristic of stepper motor.

(c) Derive winding inductance and voltage equation of induction machine.

END OF PAPER
Best of Luck