Student Exam No:-_____

GANPAT UNIVERSITY
M.TECH SEM-I ELECTRICAL ENGINEERING
REGULAR EXAMINATION DEC-2014
3EE104 - ADVANCED ELECTRICAL MACHINES

Time: 3 Hours **Total Marks:-60**

Instructions: -
1. This Question paper has two sections. Attempt each section in separate answer book.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

Q:1 (A) Develop an equivalent circuit for magnetically coupled circuit by considering any one coil as reference coil. **(05)**

(B) What is significance of transformation equations in a reference frame theory? Obtain $P_{qd0s} = P_{abcs} = 3/2 (V_{qs} i_{qs} + V_{ds} i_{ds} + 2V_{0s} i_{os})$. **(05)**

OR

Q:1 (A) Derive winding Inductances and voltage equation for induction machine by using appropriate assumptions. **(05)**

(B) Discuss the static characteristics of stepper motor. **(05)**

Q:2 (A) Draw and explain construction and working mode of a permanent magnet stepper motor **(05)**

(B) A BLDC motor has a no load speed of 6000rpm when connected to 120V DC source. Armature resistance is 2.5Ω. Find the speed when it is supplied with 60 V and developing a torque of 0.5 N-m. Neglect constant Losses. The no load current is 1A. **(05)**

OR

Q:2 (A) Define step angle in a stepper motor. Explain construction and working of hybrid stepper motor. **(05)**

(B) Compare conventional Brushless DC machine with BLDC machine and discuss the important types of BLDC machines. **(05)**

Q:3 **Attempt any two:** **(10)**

(A) A stepper motor has step angle of 1.8°. Find (a) resolution (b) number of steps required for 50 revolution and (c) shaft speed if stepping frequency is 5000 pulse/sec.

(B) Deduce $i_{qd0s} = \omega q_{dqs} + p q_{qdos}$ for capacitive element using reference frame theory.

(C) Illustrate fault detection and diagnosis techniques for induction motor.

SECTION-II

Q:4 **(A)** Discuss the features of switched reluctance motor. Compare SRM with Variable Reluctance Motor. **(05)**

(B) List out the various power converter used for SRM and explain one of them with waveforms. **(05)**

OR

Q:4 **(A)** Draw and explain inductance profile of SRM. And discuss how to alter inductance ratio of switched reluctance motor. **(05)**

(B) What is significance of sensors in BLDC machine? Enlist various sensors and sketch different possible Positioning of sensors. **(05)**

Q:5 **(A)** How does DFIG differ from synchronous generator? List out comparative points for that. **(05)**

(B) Discuss fault detection and diagnosis techniques for power transformer. **(05)**

OR

Q:5 **(A)** What is conditioning monitoring? What are the benefits of it? **(05)**

(B) Why the reactive power is required to wind mill generator? With suitable diagram illustrate the compensation of reactive power requirement of the wind mill generator. **(05)**

Q:6 **Attempt any two:** **(10)**

(A) Discuss SRM drive with block diagram. Explain its control strategy in brief.

(B) Explain single output system using induction generator for constant voltage and frequency generator.

(C) Write down short note on recent trends in condition monitoring.

END OF PAPER