

Student Exam No:- _____

GANPAT UNIVERSITY
M.TECH SEM-I ELECTRICAL ENGINEERING
REGULAR EXAMINATION DECEMBER-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) Differentiate BLDC machine with sinusoidal permanent magnet synchronous machine. Specify application area of BLDC machine. [12]
(b) Explain equivalent magnetic circuit of BLDC machines. Justify BLDC machine is DC machine.

OR

- Que-1(a) Compare axial and radial permanent magnet motors. [12]
(b) Explain significance of sensors in BLDC machine. Sketch different possible positioning of sensors.
Que-2(a) Discuss torque development phenomenon in SRM. How unidirectional torque can be obtained in SRM? [11]
(b) Justify requirement of power electronic devices in SRM, BLDC and stepper motors.

OR

- Que-2(a) Compare BLDC, SRM and stepper motor. [11]
(b) Discuss SRM drive with block diagram. Explain control strategy in brief.
Que-3 Attempt any three. [12]
(a) Why back EMF of BLDC machine is trapezoidal?
(b) Explain need of reactive power in DFIG. How it can be compensated?
(c) How constant voltage and frequency power can be generated using DFIG?
(d) Justify application of DFIG in wind power.

SECTION-II

- Que-4(a) Discuss torque-angle characteristics of stepper motor. [12]
(b) Explain construction of hybrid stepper motor. Compare it with VR and PM stepper motor.

OR

- Que-4(a) Explain unipolar and bipolar movement in stepper motor with required sketch. [12]
(b) Classify stepper motors. Mention minimum step angle that can be achieved by various stepper motors.
Que-5(a) For inductive elements derive the equation $v_{qd0s} = \omega \lambda_{dqs} + p \lambda_{qd0s}$. Discuss [11]

speed voltage.

- (b) What is vector rotator? Derive its equation. Discuss its significance.

OR

Que-5(a) Establish transformation between any two reference frame 'x' and 'y'. Show [11]
that;

$$({}^xK^y)^{-1} = ({}^xK^y)^T$$

- (b) For capacitive elements derive the equation $i_{qd0s} = \omega q_{dqs} + p q_{qd0s}$. Discuss speed currents.

Que-6 Attempt any three

- (a) Discuss electromechanical energy conversion. [12]
(b) For a two pole, 3 phase wye connected symmetrical induction machine, derive various winding inductance equations and write voltage equations at stator side as well as rotor side.
(c) What are the advantages of condition monitoring of induction motor? Explain Noise-Vibration test of induction motor.
(d) What is DGA? What is $\tan \delta$ test? Explain any one method of condition monitoring for transformer.

END OF PAPER
Best of Luck