Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1720701 **Date: 29/12/2012**

Subject Name: Advanced Electrical Machines

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

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

Q.1 (A) Explain direct saving and pay back analysis of energy efficient motor. **[7]**

Q.1 (B) Discuss various static methods to compensate reactive power. **[7]**

Q.2 (A) Discuss the basic concepts of energy efficient motor. **[7]**

Q.2 (B) What is significance of transformation equations in a reference –frame theory? Derive the relation $P_{qdos} = P_{abcs} = 3/2(v_{qs}i_{qs} + v_{ds}i_{ds} + 2v_{os}i_{os})$. **[7]**

OR

Q.2 (B) Carry out transformation of a balanced set from (a,b,c) to (d,q,0) reference frame. **[7]**

Q.3 (A) Explain working principle of permanent magnet stepper motor. Find the step angle for a 3 phase, 4 pole stepper motor having two stator teeth in one tooth pitch of a stator tooth. **[7]**

Q.3 (B) How linear induction machine is different than conventional induction machine? Explain usefulness and applications, where it preferred. **[7]**

OR

Q.3 (A) Derive winding inductances and voltage equations for induction machine. Mention assumptions made for derivation. **[7]**

Q.3 (B) Discuss the concept of discharge monitoring. Mention various category of discharge. Explain RF coupling method for the detection of early discharge. **[7]**

Q.4 (A) Discuss block diagram of typical electromechanical system. Explain energy balance in such system. **[7]**

Q.4 (B) Explain in brief construction and working principle of hybrid stepper motor. **[7]**

OR

Q.4 (A) Discuss essential elements in condition monitoring system. Explain the principle of hall effect devices and their benefits over other sensors. **[7]**

Q.4 (B) Discuss typical root causes and failure modes of electrical machines. How condition monitoring can help in diagnosis of machine health. **[7]**

Q.5 (A) Explain electromechanical energy conversion in SRM. **[7]**

Q.5 (B) Explain the working principle of BLDC machine. Explain difference between BLDC machine and synchronous machine. **[7]**

OR

Q.5 (A) Compare between outer rotor and inner rotor BLDC motor. **[7]**

Q.5 (B) Explain with suitable diagram the compensation of reactive power requirement of the windmill generator. **[7]**

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