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Question Paper Code : 71629

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

First Semester

Power Electronics and Drives

PE 9211/PE 911 – ANALYSIS OF ELECTRICAL MACHINES

(Common to M.E. Power Systems Engineering)

(Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you mean by co-energy?
2. Compare single and doubly excited system.
3. What is the function of static reference frame?
4. List out the variables observed from several frames of reference.
5. Write the general torque equation of DC machine.
6. What is the significance of state equations?
7. What do you mean by steady state operation of induction machine?
8. What is the function of free acceleration characteristics?
9. What is rotor angle?
10. Define transient stability limit.

PART B — (5 × 16 = 80 marks)

11. (a) Derive the general expression of stored magnetic energy, co-energy and force for doubly excited system.

Or

(b) Discuss in detail the calculation of air gap mmf and per phase machine inductance using physical machine data.

12. (a) Explain the reference frame theory.

Or

(b) Explain the transformation of a balanced set using a suitable diagram.

13. (a) Deduce the voltage equation of a DC Machine and explain the dynamic characteristics of permanent magnet DC motor.

Or

(b) Explain in detail the solution methodology of obtaining the dynamic characteristics by Laplace transformation.

14. (a) Explain in detail the transformation for rotor circuits for induction machines and also explain the voltage and torque equations in reference frame variables.

Or

(b) Describe in detail the computer simulation of induction machines in arbitrary reference frames.

15. (a) Discuss the significance of voltage and torque equations in synchronous machines.

Or

(b) (i) Explain critical clearing time. (8)

(ii) Describe the dynamic performance of synchronous machines during three phase fault conditions. (8)
