Z 6349

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Second Semester

Power Electronics and Drives

PE 1651 — COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS

(Regulation 2005)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name three conventional design procedures of electrical apparatus.

2. What are the requirements of field analysis based design?

3. Express the significance of mathematical formulation of field problems.

4. Represent the Laplace and Poisson's equations.

5. What is the role of stiffness matrix in design?

6. Why should energy minimization be considered?

7. List two packages for CAD of electrical apparatus.

8. Do boundary conditions affect the nature of design? If so how?

9. What are the salient features involved in the design of solenoid actuator?

10. Mention the design aspects of insulators.

11. (a) (i) What are the aims of a designer? (5)

    (ii) Represent the design flow chart, for an electrical apparatus. (6)

    (iii) What are the assumptions of a design? (5)

Or

(b) What are the design equations of a single phase transformer? List them and also derive them. (16)

12. (a) (i) Discuss the energy stored in the electric field and comment on the field energy. (8)

    (ii) Derive Laplace and Poisson's equations. (8)

Or

(b) Describe how the electromagnetic field equations are used in mathematical formulation of field problems. (16)

13. (a) Name the two basic numerical methods which can be used to solve the Laplace equation. Explain how the field problem can be reduced into a set of simultaneous equations. (16)

Or

(b) (i) Write about energy minimization in FEM. (4)

    (ii) Obtain the finite difference approximation for the Laplace's equation in spherical polar co-ordinates. (12)

14. (a) What are the various approaches in CAD? Discuss their features on flow charts? (16)

Or

(b) Give the details of making a design of a rotating electrical machine using a common CAD package stepwise. (16)

15. Explain neatly the design application to

(a) Solenoid actuator (16)

Or

(b) Power transformer. (16)

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