Q 8291

M.E. DEGREE EXAMINATION, MAY/JUNE 2006.

First Semester

Power Electronics and Drives

PE 1651 — COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS

(Regulations 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name two limitations of conventional design procedures.
2. Define magnetic vector potential.
3. Write Laplace's equation.
4. What is energy functional?
5. Define stiffness matrix.
6. What are shape functions?
7. Name two packages for CAD of electrical apparatus.
8. List the elements of a CAD system.
9. Define meshing in CAD of electrical apparatus.
10. Why do you need pre processing in CAD systems?

PART B — (5 × 16 = 80 marks)

11. (i) A power transformer has the following ratings : three phase, 11000 V/400 V, 50 Hz, 400 kVA, Y/Y. Write the detailed steps involved in the CAD of the above transformer using any one commonly used package. Answer should highlight on the electrical and magnetic circuit design of the apparatus. (12)

(ii) Write about the need for field analysis based design. (4)

12. (a) Explain how electro magnetic field equations are used in mathematical formulation of field problems. (16)

Or

(b) Write short notes on :

(i) Electrical vector/scalar potential

(ii) Poisson's equation

(iii) Stored energy in field problems. (16)

13. (a) (i) Compare in detail finite difference method with FEM. (10)

(ii) Describe energy minimization in FEM. (6)

Or

(b) Describe in detail about

(i) Solution techniques in FEM

(ii) Mathematical models in FEM using differential or integral equations. (8 + 8)

14. (a) (i) Explain how will you set up boundary conditions and include material properties in a CAD package. (10)

(ii) Describe the various elements of a CAD system. (6)

Or

(b) (i) List the salient features, advantages, limitations of any one commonly used CAD package. (9)

(ii) Write about post processing and meshing in CAD packages. (7)

15. (a) Write in detail the steps involved in the CAD of a suspension type insulator for high voltage transmission line. Assume cemented cap type porcelain insulator. (16)

Or

(b) (i) Compare conventional design procedure with CAD of electrical apparatus. (8)

(ii) Write about variational method in FEM. (8)
