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M.E./M.Tech. Degree Examinations, January 2017

First Semester

POWER ELECTRONICS AND DRIVES

PD16003 - ELECTROMAGNETIC FIELD COMPUTATION AND MODELING

(Regulation 2016)

QP Code: 454401

Time: Three hours

Maximum : 100 marks

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

1. Write the principle of energy conversion.
2. Write the expression for continuity equation.
3. What are the limitations of the conventional design procedure?
4. Mention few analytical methods of field computation.
5. What do you mean by stiffness matrix?
6. What are shape functions and its role in FEM?
7. State Ampere's circuital law.
8. Define skin effect.
9. What is the function of bushings in a transformer?
10. Give the EMF equation of a transformer.

PART B - (5 X16 = 80 Marks)

11. (a) Describe in detail the principle of energy conversion in an electromagnetic field. **(16)**
(OR)
(b) Write the differential form and integral form of Maxwell's equations and explain their significance. **(16)**
12. (a) Explain in detail the dielectric boundary conditions in electrostatics. **(16)**

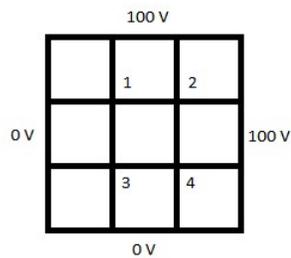
(OR)

- (b) Write short notes on:
- (i) Field analysis based design. (8)
 - (ii) Finite difference method. (8)

13. (a) Discuss in detail 1D and 2D planar and axial symmetry problem. (16)

(OR)

- (b) Use the FDM technique to find the potentials at nodes 1 to 4 in the Potential System as shown in figure. (16)



14. (a) Derive the expression for energy stored in electric field in vector form. (16)

(OR)

- (b) Describe in detail computational procedure adopted for electric and magnetic field intensities. (16)

15. (a) Explain in detail about singly excited rotating actuator and give the relevant equations. (16)

(OR)

- (b) (i) Describe the salient features and considerations of rotating DC machine design. (10)
- (ii) What are the factors to be considered for designing of insulators. (6)