

**M. E. ELECTRICAL ENGINEERING Examination FIRST YEAR SECOND SEMESTER
EXAMINATION 2019**

HIGH VOLTAGE FIELDS

Time: Three hours.

Full Marks: 100

Answer any five questions.

1. a) Discuss about the accuracy criteria and the factors affecting the accuracy in Charge Simulation Method. 10
- b) Fig. 1 shows the arrangement for a parallel plate capacitor. Total sixteen nodes have been placed on the electrodes and in the region in between them respectively. All adjacent nodes are at equal distances from each other. Compute the values of potentials for nodes 6, 7, 10 and 11 respectively, up to second iterations. 10
2. a) Discuss in brief how hybridization of Finite Element Method and Charge Simulation Method could be done for numerical electric field computation. 8
- b) State how acceleration of convergence by over-relaxation is done. 8
- c) State the disadvantages of FEM. 4
3. a) Discuss about the method of calculation of electric field including volume resistance by Charge Simulation Method under transient voltages. 14
- b) Explain uniqueness theorem in connection with solution of Laplace or Poisson's equation. 6
4. A cylindrical and a spherical gas bubble are present in uniform field in transformer oil. In which case the field intensity within the gas bubble will be higher? Derive the formulae used. 20

5. a) Discuss the method of 'region oriented charge simulation method.' 12
 b) Derive the FEM equations in axi-symmetric system. 8
6. a) Explain the method of conformal transformation. Also explain exponential transformation. 12
 b) Explain how conformal transformation can be applied in the case of coaxial cables for finding electric field. 8
7. a) Derive the expression for mechanical force developed on the electrode boundary. 8
 b) Deduce an expression for film pressure on insulator boundary. 12
8. Write short notes on any two of the following: 10×2
- Potential and field intensity coefficients due to infinite line charge.
 - Indirect boundary element method.
 - Application of FDM in 2-D multi-dielectric system.

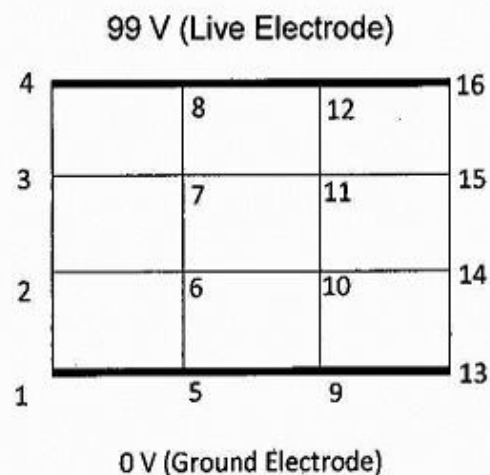


Fig. 1.