M. E. ELECTRICAL ENGINEERING Examination, 2018
(First Year, 2nd Semester)

HIGH VOLTAGE FIELDS

Time: Three hours. **Full Marks: 100**

Answer any five questions.

1. a) For an axi-symmetric system with unequal nodal distances derive the expression for the potential of a node lying away from the axis of symmetry. 10

   b) For the 2 – dimensional multi-dielectric configuration shown in Fig. 1, write the FDM equations for nodes having unknown potentials. 10

2. a) Deduce expressions for the voltages inside and outside a dielectric sphere placed in a uniform field. 8

   b) Deduce the equation for potential in 2 – D multi-dielectric system using FDM. 8

   c) State the disadvantages of FEM. 4

3. a) Discuss the basic principle of charge simulation method. 6

   b) Deduce the expressions for potential coefficient and field co- efficient along r-axis for a finite length line charge. 14

4. a) Discuss how electric field including volume resistance can be computed using CSM. 15

   b) Discuss in brief hybrid method of field calculation. 5

5. a) Derive the FEM equations in the case of two dimensional fields. 10

b) Derive the FEM equations in axi-symmetric system. Explain how the nodes are placed in a multi-dielectric system for field computation using FEM. 7+3

6. a) Explain the methods – i) exponential transformation and ii) logarithmic transformation. 10

   b) Discuss the behavior of a conducting sphere placed in a uniform field. 10

7. a) Derive the expression for pressure developed at the insulator-insulator boundary. 16

   b) Derive the expression for mechanical force developed on the electrode boundary. 4

8. Write short notes on any two of the following: 10×2

   i. Indirect boundary element method.
   ii. Region oriented charge simulation method.
   iii. Field calculation by CSM including volume resistance subjected to transient voltage.
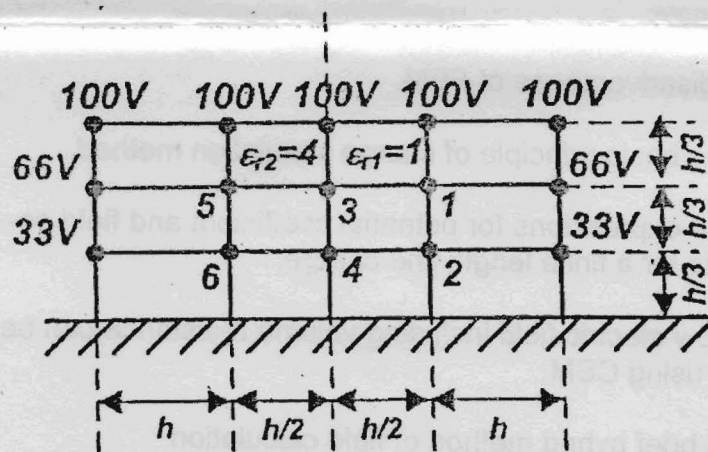

Fig. 1.