

Total No. of Questions : 6]

SEAT No. :

P215

[Total No. of Pages : 2

**BE/INSEM/APR-544**

**B.E. (Electrical)**

**403149A : HIGH VOLTAGE ENGINEERING (Elective - III)**

**(2015 Pattern) (Semester - II)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates :*

- 1) *Answer to the three units should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *You are advised to attempt not more than 3 questions.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**UNIT - I**

- Q1)** a) Explain Streamers mechanism of breakdown in gases. [6]
- b) A steady current of 400  $\mu$ amp. flows through flat electrodes separated by distance of 5mm. When voltage of 10 kV is applied. Determine Thousand's first ionization coefficient if current of 50  $\mu$ A flows when distance of separation reduces to 1mm and field is kept constant as previous. Find Townsend's secondary ionization coefficient. [4]

OR

- Q2)** a) In an experiment, in a certain gaseous dielectric material, the breakdown test is performed under two electrode configurations. The gap spacing between electrodes is varied and breakdown voltage value is noted in each case. Following observations are recorded. [6]

	Gap Spacing (mm)	4.10	6.16	8.21	10.26
Sphere - sphere electrode	Breakdown Voltage (kV)	9.2	14.7	19.3	25.0
Needle plate electrode		5.0	8.4	10.8	13.3

Calculate breakdown strength for each reading and based on readings, comment about strength of air under uniform field and non-uniform field.

**P.T.O.**

- b) Explain time lag for breakdown and factors on which time lag depends. [4]

### UNIT - II

- Q3)** a) What is composite dielectrics. Explain the effect of multiple layers, thickness of layers and interfaces on the breakdown in composite dielectric material. [6]
- b) With neat sketches explain Cavitation and bubble theory for breakdown in liquid dielectrics. [4]

OR

- Q4)** a) Explain stressed oil volume theory of breakdown for liquid dielectrics. [5]
- b) A solid dielectric material with dielectric constant of 4.8, has an internal void of thickness 1mm. The specimen is 1cm thick and is subjected to a voltage of 100kV rms. If the void is filled with air and breakdown strength of air is 30kV/cm (peak), find voltage at which internal discharge occurs. [5]

### UNIT - III

- Q5)** a) Explain generation of high frequency AC voltage with the help of Tesla coil. [6]
- b) Draw a neat sketch of a standard impulse voltage wave. Explain specifications for standard lightning wave and tolerances. [4]

OR

- Q6)** a) Explain generation of impulse voltage using Multistage Marx Circuit. Describe the different important parts of a multistage impulse generator. [6]
- b) With neat circuit diagram explain Series resonant transformer for generating high ac voltage. [4]

