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**SUBJECT CODE NO: E-19**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**B.E.(EEP/EE/EEE) Examination Nov/Dec 2017**  
**High Voltage Engineering**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Question no. 1 & Question no. 6 are compulsory.
- ii) Attempt any two questions from remaining questions of each section.
- iii) Assume suitable data wherever necessary.

Section A

- Q.1 Solve any five 10
- a) What is governing equation for the electrical potential  $V$  for triangular elements in FEM?
  - b) What is the principle of charge simulation method?
  - c) Why there is need to control electric stress in voltage equipment?
  - d) List out the various methods for estimation of electric field stresses.
  - e) State the application of insulating material in power cables.
  - f) What is difference between insulation and dielectrics?
  - g) What is treeing and tracking?
  - h) State applications of insulating materials.
- Q.2 a) Explain the procedure to control electric field intensity in HV equipment. 07
- b) What is "Finite Element Method"? Give outline of this method for solving field problems. 08
- Q.3 a) Describe the current growth phenomenon in a gas subjected to uniform electric fields. 07
- b) Explain the experimental set-up for the measurement of pre-breakdown currents in a gas. 08
- Q.4 a) Discuss the factors that influence conduction in pure liquid dielectrics and in commercial liquid dielectrics. 07

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- b) Explain various theories that explain breakdown in commercial liquid dielectrics. 08
- Q.5 a) What is 'thermal breakdown' in solid dielectrics, and how is it practically more significant than other mechanisms? 07
- b) Explain the different mechanisms by which breakdown occurs in solid dielectrics in practice. 08

### Section B

- Q.6 Solve any five 10
- a) State different forms of high voltages.
- b) Draw the circuit diagram of full wave rectifier.
- c) What are the limitations of series resistance micrometer?
- d) Draw schematic diagram of a generating voltmeter (rotating vane type).
- e) State causes for switching and power frequency over-voltages.
- f) Define Basic Impulse Level (BIL).
- g) Define Partial-discharge magnitude
- h) Define Disruptive Discharge Voltage.
- Q.7 a) Explain with diagrams, different types of rectifier circuits for producing high dc voltages. 07
- b) Why is Cockroft-Walton circuit preferred for voltage multiplier circuits? Explain its working with a schematic diagram. 08
- Q.8 a) Discuss briefly the different methods of measuring high dc voltages. What are the limitations of each method? 07
- b) Describe the generating voltmeter used for measuring high dc voltages. How does it compare with a potential divider for measuring high dc voltages? 08
- Q.9 a) Explain the different theories of charge formation in clouds. 07
- b) What are the mechanisms by which lightning strokes develop and induce overvoltage's 08

Q.10

on overhead power lines?

- a) Define ‘complex permittivity’. What are the factors that govern the quantities ‘relative permittivity’ and ‘loss factor’? 07
- b) What are the different power frequency tests done on insulators? Mention the procedure for testing. 08