Code No: R05320206 **Set No. 1**

III B.Tech II Semester Regular Examinations, Apr/May 2008
HIGH VOLTAGE ENGINEERING
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) How is the electric field intensity/ electric stress controlled?
   (b) Explain about uniform and non-uniform electric fields. [8+8]
2. Explain in detail about thermal breakdown mechanism in commercial liquids. [16]
3. Explain the breakdown mechanism in composite dielectrics due to aging and partial discharges. [16]
4. (a) How are the wave front and wave tail times controlled in impulse generator circuits.
   (b) An impulse generator has eight stages with each condenser rated for 0.16 μF and 125 kV. The load capacitor available is 100 pF. Find the series Resistance and damping Resistance needed to produce 1.2/50 μs impulse wave. What is the maximum output voltage of the generator, if the charging voltage is 120 kV? [8+8]
5. (a) What are the advantages and disadvantages of an electrostatic voltmeter when used to measure high voltages.
   (b) What is a mixed potential divider? How is it used for impulse voltage measurements. [8+8]
6. Give the mathematical models for lightning discharges and explain them. [16]
7. Explain the operation of high voltage Schering bridge when the test specimen
   (a) is grounded
   (b) has high loss factor? [8+8]
8. What is an operating duty cycle test on a surge arrester? Why is it more significant than other tests? [16]

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Code No: R05320206 **Set No. 2**

III B.Tech II Semester Regular Examinations, Apr/May 2008
HIGH VOLTAGE ENGINEERING
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Define the degree of uniformity of an electric field. Discuss the degree of uniformity for simple electrode configurations. [16]
2. Write short notes on:
   (a) Photo-ionization
   (b) Secondary ionization. [8+8]
3. Explain in detail about the long-term breakdown in composite dielectrics. [16]
4. (a) Discuss about resonant transformers in detail.
   (b) A Cockroft-Walton type voltage multiplier has eight stages with capacitances, all equal to 0.05 μF. The supply transformer secondary voltage is 125KV at a frequency of 150Hz. If the load current to be supplied is 5mA, find
      i. The percentage ripple
      ii. The regulation
      iii. The optimum numbers of stages for minimum regulation or voltage drop.
   [8+8]
5. Explain the principle and construction of an electro static voltmeter for very high voltages. What are its merits and demerits for high voltage AC measurements? [16]
6. Explain the different aspects of insulation design and insulation co-ordination adopted for EHV systems? [16]
7. Briefly explain the methods used for calibrating the partial discharge detectors[16]
8. (a) What are the significance of power factor tests and partial discharge tests on bushings? How are they conducted in the laboratory?
   (b) Explain the partial discharge tests on high voltage cables? [8+8]

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Code No: R05320206 **Set No. 3**

III B.Tech II Semester Regular Examinations, Apr/May 2008
HIGH VOLTAGE ENGINEERING
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the applications of insulating materials in the construction of capacitors. [16]

2. State and explain Pachen's law. Derive the expressions for $(pd)_{min}$ and $(V_b)_{min}$. Assume A=12, B=365 and γ=0.02 for air. Determine the $(pd)_{min}$ and $(V_b)_{min}$.[16]

3. (a) What are the mechanisms that lead to intrinsic breakdown of a solid?
   (b) Explain about the treeing in solid insulating materials. [8+8]

4. (a) Derive an expression for voltage efficiency of single stage impulse generator.
   (b) An impulse current generator has total capacitance of 15 μF, the charging voltage of 125 kV, the circuit inductance 2 mH and the dynamic resistance 1ohm. Find the peak current and wave shape of the wave. [8+8]

5. Discuss and compare the performance of
   (a) Resistance
   (b) Capacitance potential dividers for measurement of impulse voltages? [8+8]

6. Derive the expressions for the voltage and current waves on long transmission lines and obtain the surge impedance of the line? [16]

7. What is non destructive testing of insulating materials? Give very briefly the characteristics of these methods. [16]

8. Mention the different electrical tests done on isolators and circuits breakers. [16]

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Code No: R05320206 **Set No. 4**

III B.Tech II Semester Regular Examinations, Apr/May 2008
HIGH VOLTAGE ENGINEERING
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Discuss about surge voltage and their distribution and control in high voltage power apparatus. [16]

2. (a) Explain in detail ionization by collision with neat diagrams.
   (b) Explain the difference between photo-ionization and photo electric emission. [8+8]

3. Explain thermal breakdown in solid dielectrics. How this mechanism is more significant than the other mechanisms. [16]

4. (a) Explain with diagrams, different types of rectifier circuits for producing high DC voltages.
   (b) Determine the ripple voltage and regulation of a 10 stage Cockroft-Walton type DC voltage Multiplier circuit having a stage capacitance = 0.01 μF, supply voltage = 100 kV at a frequency of 400 Hz and load Current = 10 mA. [8+8]

5. What are the problems associated with measuring very high impulse voltages? Explain how these can be taken care during measurments. [16]

6. (a) Explain the different theories of charge formation in clouds?
   (b) What are the mechanisms by which lightning strokes develop and induce over voltages on overhead power lines? [8+8]

7. Explain the concept of apparent charge in partial discharge measurements. Describe a simple experiment technique to measure partial discharge [16]

8. Mention the different electrical tests done on isolators and circuits breakers. [16]

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