Code No: D5603 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II SEMESTER EXAMINATIONS, APRIL/MAY 2012
SURGE PHENOMENA AND INSULATION COORDINATION
(POWER SYSTEMS (HIGH VOLTAGE))

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1. Obtain an expression for the Surge impendance of transmission line and for the velocity of propagation of electric waves in terms of the line inductance and capacitance.

2. An over head line is connected in series with a cable. The overhead line has an impedance of 2 mH/km and capacitance of 0.01 µF/km. The cable has an inductance of 0.25 mH/km and capacitance of 0.102 µF/km. If a surge having a maximum value of 100 kV travels along the over head line towards its junction with the cable, calculate
   a) The surge impedance of the line
   b) The velocities of wave propagation in the line
   c) Reflected and transmitted waves of voltage and current at the junction. If the 100 kV surge originates in the cable, calculate the reflected and transmitted wave of voltage and current at the junction.

3. Explain the mechanism of lightning discharge.

4. Explain about high voltage circuit breakers and their operation in detail.

5. What are the methods adopted to protect against lightning. Explain in detail.

6. Describe the mechanisms of breakdown of a long air gap by
   a) Lemke's model
   b) Water's mode and
   c) Alexandeov's model

7. Describe the insulation coordination in an EHV substation.

8. Write short notes on
   a) Transient recovery voltage
   b) Switching over voltages.

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