

Printed Pages—4

TEE—021

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 0289**

Roll No.

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**B.Tech.**(SEM VIII) EVEN SEMESTER THEORY EXAMINATION,  
2009-2010**EHV AC AND DC TRANSMISSION**

Time : 3 Hours

Total Marks : 100

**Note :** (i) Answer all questions.

(ii) All questions carry equal marks.

**1.** Answer any four parts of the following : **(4x5=20)**

- (a) Explain the need of EHV - AC transmission.
- (b) Enumerate standard test voltages in AC and DC transmission systems.
- (c) Compare EHV AC and DC transmission with respect to following aspects :
  - (i) Stability
  - (ii) Voltage control
  - (iii) Economics of power transmission
- (d) Determine surface voltage gradient on a sub conductor of radius  $r$  in a bundled conductor with 2 sub - conductors spaced at a bundle spacing  $B$  and with bundle height above ground  $H$ .

- (e) Explain following wind induced oscillations and vibrations :
- (i) Aeolian vibration
  - (ii) Galloping
  - (iii) Wake - induced oscillation
- (f) Discuss modern trends in EHV AC and DC transmission system.

2. Answer any four parts of the following : (4x5=20)

- (a) What are the effects of corona in high voltage transmission lines ?
- (b) Differentiate between glow - type corona and pulse - type corona discharges.
- (c) What is audible noise and how is it generated ? Give a circuit for measurement of audible noise and explain it.
- (d) Explain principle of half wave transmission.
- (e) Explain phenomenon of ferroresonance. Discuss its impact.
- (f) How are switching surges produced ? Discuss methods of reduction of switching surges in EHV system.

3. Answer any two parts of the following : (2x10=20)

- (a) (i) Draw lightning - impulse voltage wave and explain it.
- (ii) What is a Marx Multiplier circuit and how does it function to generate very high impulse voltages ?

- (b) List various methods of measuring dc and ac high voltages. How does a sphere gap measure high voltage ? Discuss technique to be followed in using this.
- (c) What is meant by "Insulation Coordination" based on lightning ? What are basic Impulse Insulation Levels ?

4. Answer any two parts of the following : (2x10=20)

- (a) Explain different types of dc links used in HVDC transmission giving their merits and demerits.
- (b) Explain basic control characteristics of converter. How is this characteristics modified to meet the requirements of :
  - (i) mode stabilization ?
  - (ii) voltage dependent current limit ?
- (c) A dc link has a loop resistance of 10 ohm and is connected to transformers giving secondary voltages of 120 kV at each end. The bridge converters operate as follows :

Rectifier :  $\alpha = 15^\circ$ ,  $X_L = 15 \text{ ohm}$

Inverter :  $\gamma = 15^\circ$ ,  $\delta = 10^\circ$ ,  $X_L = 15 \Omega$

Where  $\gamma$  = overlap angle,  $\delta$  = margin angle  
 $\alpha$  = delay angle.

Calculate the direct current delivered if the inverter operates at constant  $\beta$  control.

5. Answer any two parts of the following : (2x10=20)

- (a) What are the causes of overvoltage in HVDC transmission system ? Discuss methods for overvoltage protection.
- (b) What is the source of generation ac harmonics ? Discuss series and shunt filters for reducing harmonics giving their merits and demerits.
- (c) What is the necessity of using multiterminal lines ? Explain constant voltage parallel scheme with the help of control diagram.

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