iii) The maximum current which the circuit breaker contacts have to carry.

iv) The maximum interrupting current of the breaker if the contacts part after 1½ cycle (f=50Hz).

11. a) Write a note on generation and mitigation of harmonics in HVDC systems.

b) Describe in brief Ferro-Resonance overvoltage.

12. a) Explain the principle of half wave transmission in power environments. Also discuss the advantages of half wave transmission.

b) What are the important devices of FACTS? Explain the role of any one FACTS controller.

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

Paper ID : 120755

B. Tech.

(SEM. VII) THEORY EXAMINATION, 2015-16

EHV AC & DC TRANSMISSION

[Time:3 hours] [Total Marks:100]

SECTION-A

Attempt all parts. All parts carry equal marks. (2×10=20)

(a) Give two major considerations in mechanical design of the transmission line.

(b) What is the need of EHVAC transmission in the current scenario?

(c) List the methods of reduction of switching surges in EHV system.

(d) Define 'Tail Time' and 'Front time' in impulse voltage waveform.

(e) List various types of converter control scheme.

(f) What is Marx Multiplier circuit and where is it used?

(g) What do you mean by the term 'Insulation Coordination'?

(h) Write down three specific areas of application for MTDC system.

(i) Explain the choice of voltage level in DC transmission System in brief.

(j) Why is the reversal of power in HVDC link done?

SECTION-B

Attempt **any five** question from this section. (5×10=50)

2. Discuss the technical and economic advantages of DC transmission System?

3. Derive in brief about measurement of high voltage using:

   i) Sphere Gap, and

   ii) Purely capacitive potential divider.

4. a) Describe with the help of a neat diagram the control hierarchy of the bipolar HVDC system.

   b) Discuss in brief the back to back type of HVDC link.

5. What is a smoothing reactor? How are the converters protected from over voltages?

6. a) For r=1 cm, H=5cm, f=50 Hz, Calculate corona loss (Pc) according to the Peek's formula when $E=1.1\,E_0$ and $\delta = 1$. The term used bear the usual meaning.

   b) Describe the power loss calculation of corona loss based on voltage and voltage gradient.

7. Write a detailed note on design of EHV lines based on steady state limits.

8. Describe the various types of converter faults. What protection is used against over currents in an HVDC system?

9. What are the various method of generating High AC voltage? Draw a schematic diagram to depict internal arrrangement of 2 unit cascade–connected transformer with excitation and measuring circuits.

SECTION-C

Attempt **any two** questions from this section. (2×15=30)

10. A 400 kV system has a generated capacity of 2000 MVA. Calculate.

    i) The Normal current

    ii) The rms value of the short circuit current for a bus fault on the transformer HV winding, if $X_d' + X_1 = 0.5$ pu base on the 400 kV.