MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PE-EE 601B HVDC Transmission

UPID : 006746

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following : [1 x 10 = 10]

(I) What is meant by an Asynchronous tie?

(II) Define current margin.

(III) What are two types of programs used for HVDC system studies?

(IV) What are the types of DC link?

(V) List different types of converters in HVDC systems.

(VI) What is the necessity of control in a DC link?

(VII) State the ill effects of harmonics injected into the AC line?

(VIII) Write equations representing the equivalent circuit of lumped element.

(IX) What is meant by pulse number of a converter?

(X) What are advantages of EMPT representation of elements in DC system?

(XI) Why circuit turn off time should be greater than the thyristor turn-off time?

(XII) Mention the various modes of operation of rectifier characteristics.

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. Explain protection of converter station against over current and over voltages. [5]
3. Briefly state the effect caused by harmonics. [5]
4. Explain drawbacks of constant current control (CCC). [5]
5. Compare insulation characteristics of DC and AC cable. [5]
6. Explain the criteria for selection of DC filter. [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. (a) Differentiate between the two start-up procedures based upon the pulse. [8]
   (b) Describe starting and stopping of DC link. [7]
8. (a) Explain in detail, the different configurations of static VAR system. [6]
   (b) Derive an equation for harmonic voltage and current for single tuned filter and discuss the influence of network admittance on design . [9]
9. (a) Explain the characteristics of a Rectifier and an Inverter with sketches. [9]
   (b) With a block diagram, discuss the principle of operation of a basic power controller. [6]
10. (a) What are the various sources of harmonics generation in a HVDC line? [5]
    (b) Derive the relationship between pulse conversion and harmonics generated. [5]
    (c) What are the affects of Harmonics produced by the HVDC converters? [5]
11. For a 3-Φ, 6 pulse Graetz's circuit, draw the timing diagram considering overlap angle is less than 60^{o} and without overlap for the following: [15]
    (a) Voltage across load
    (b) Voltage across any two pair of conduction values

*** END OF PAPER ***