B. Tech.

(SEM. VIII) EXAMINATION, 2007-08

EHV AC & DC TRANSMISSION

Time : 3 Hours]   *[Total Marks : 100*

Note :   Attempt **all** questions.

1   Attempt any **two** of the following:

    (a)   Write five major points on the following :

        (i)   Comparison of EHV AC with DC transmission.

        (ii)   Need of EHV transmission.

    (b)   Derive the expression for minimum and maximum potential gradients for a 2-conductor bundle. Show that it follows the Cosine Law.

    (c)   Write a detailed note giving account of the modern trend of power transmissin in India. Also discuss the EHV, H.V. transmission, sub-transmission and distribution voltage levels existing in India.

2   Attempt any **four** of the following:

    (a)   Can there be any advantage of corona? If yes, describe the same. If no, give the reasons.

    (b)   Discuss about the acceptable RI level at receiver. What is RI generated corona?

(c) The corona loss formulae are either based on "voltage" or on "voltage gradient". Write down and describe lthe formula for corona loss one each from above categories.

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

(e) Describe in brief about Ferro-Resonance over voltages.

(f) Enumerate the methods used for reduction of switching surges on EHV systems. Discuss any one of them in brief.

3   Attempt any **two** of the following :

(a) Describe in brief about measurement of High Voltage using
   (i) sphere gap and
   (ii) purely capacitive potential divider.

(b) Write a detailed note on design of EHV lines based on steady state limits.

(c) For 400 kV and 750 kV lines, calculate the required conductor-to-tower clearances given the following data : Maximum pu value of lightning impulse is 2.8 pu for both lines. The standard deviations are 5% for both power frequency and lightning. The gap factor for conductor-tower is 1.3

4   Attempt any **two** of the following:

(a) Describe the control hierarchy for a bipolar HVDC system (with the help of diagram). Discuss the `Equidistant Firing Control' in detail.

(b) (i) What is the power flow through synchronous HVDC link. Discuss the power flow control through inter-connection by non-synchronour HVDC link.

(ii) Describe a 12 pulse bridge converter in detail.

(c) Discuss about Back to Back HVDC link. How does it compare with the other type?

5 Attempt any **two** of the following :

(a) What is a smoothing reactor? How are the converters protected from over voltages?

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

(c) Discuss about MTDC on its types and protection

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