GANPAT UNIVERSITY
B.TECH SEM-VIII (ELECTRICAL)
REGULAR EXAMINATION APRIL-JUNE-2015
2EE833:-EHV AC & HVDC TRANSMISSION

Time: 3 Hours   Total Marks:-70

Instructions: - 1. Attempt all questions.
              2. Make suitable assumptions wherever necessary.
              3. Figures to the right indicate full marks.

SECTION-I

Que.-1 (A) In the USA, for transmitting power of 10000 MW over 285 km, a voltage of 1150 kv was   [06]
             selected. In U.S.S.R., for transmitting a power of 5000 MW over 800 km, the same voltage
             level was selected. Give your comments on the reasons this level is suitable and what the
             possible reasons for such choice. Discuss through % line losses by comparing it with other
             suitable voltage classes could have been found suitable.

        (B) How can we decide the power handling capacity of a transmission line and what are the   [06]
             trends relating to power handling capacity of ac transmission line and line losses.

OR

Que.-1 (A) A power of 12000 MW is required to be transmitted over a distance of 1000km.Suggested   [06]
             voltage levels and corresponding average parameters are as following. Determine (a)
             Possible number of circuits required with equal magnitudes for sending end and receiving
             end voltages with 30 degree phase difference. (b)The currents transmitted and (c) The total
             line losses.

System in kV	400kV	750kV	1000kV	1200kV
r, ohm/km	0.031	0.0136	0.0036	0.0027
x, ohm/km	0.327	0.272	0.231	0.231
x/r	10.55	20	64.2	85.6

        (B) Which are the important parameters of consideration while designing a EHVAC   [06]
             transmission line?

Que.-2 (A) Find the disruptive critical voltage and visual corona voltage for 3-phase 220 KV, 50 Hz,   [05]
             250 m long line consisting of 22.26 mm diameter conductors spaced in a 6 m delta
             configuration. The following data can be assumed. Temperature 25 c, Pressure 73 cm of
             mercury, surface factor 0.84, irregularity factor for local corona 0.72, irregularity factor for
             general corona 0.82. Also find the total loss in fair weather and bad weather using peek's
             formula.

        (B) Discuss charge -voltage diagram with corona consideration and also explain attenuation of   [06]
             travelling waves due to corona loss.

OR

Que.-2 (A) Can we use methods of images for accounting the effect of ground on the value of line   [05]
             capacitance? Justify your answer.

        (B) (1) A 3 phase line yields AN levels from individual phases to be 55 dB, 52 dB, and 48 dB.   [03]
             Find the resulting AN level of the line.

             (2) An Octave band has a center frequency of 1000 Hz (a) Calculate the upper and lower   [03]
             frequencies of the band (b) Calculate the same for third octave band.

Que.-3   **Attempt any two.**   [12]

(A)   What do you mean by RI? How propagation of RI takes place?

(B)   Explain requirement of heat balance in EHVAC transmission line and discuss how it takes place.

(C)   Explain the various types of bundled conductor configuration and its effect on transmission line capability.

SECTION-II

Que.-4   (A)   Which are the main factors of consideration of HVDC transmission planning? Also discuss the choice of voltage for HVDC line.   [06]

(B)   Discuss effect of firing angle on DC terminal voltage & valve voltage by using voltage – firing angle characteristics.   [06]

OR

Que.-4   (A)   What are the main operating problem of HVDC transmission system? Discuss in brief.   [06]

(B)   Discuss important control characteristics of the converter.   [06]

Que.-5   (A)   What you mean by VSC converter? Analyse VSC converter in detail.   [05]

(B)   Explain configuration of EHV AC transmission line in detail.   [06]

OR

Que.-5   (A)   A 400 kV, line in India uses a 2 conductor bundled with diameter dm= 0.0318 m for each conductor. The phase current is 1000 Amps (500 Amps per conductor). The area of each conductor is 515.7 mm^2, pa=2.7*10^{-8} ohm-m at 20^0 C. α=0.0045 ohm/degree C at 20^{0}C. Take the ambient temperature t_a=40^0 C, atmospheric pressure P=1, Wind velocity Vm= 1 m/s, e= 0.5 and neglect solar irradiation. Calculate the final temperature of conductor due to only I^{2}R heating. Take l= 1.05 m.   [05]

(B)   Discuss the reactive power requirement of HVDC substations. Which Devices used for inserting Reactive power to the HVDC System?   [06]

Que.-6   **Attempt any Two.**   [12]

(A)   Compare HVAC transmission with HVDC transmission.

(B)   Why high voltage transmission line is preferred? Give appropriate reasons.

(C)   Discuss important mechanical consideration in transmission line performance.

END OF PAPER