Exam.Code:1018
Sub. Code: 7477

2063

M.E. Electrical Engineering (Power Systems)
Second Semester
EE-8202: EHV AC Transmission

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt <u>any five</u> questions. Missing data (if any) can be appropriately assumed.

x-x-x

Q1. Explain it briefly

A) Write the formula for power handling capacity of a signal circuit transmission line. **(01)**

B) Define the term line loadability. **(01)**

C) Write the two components to the flux linkage of inductance of two conductors. **(01)**

D) What are the characteristics of wave propagation on the phase conductance? **(01)**

E) Write the formula for geometric mean radius of the bundle conductor. **(01)**

F) Write the two assumptions to make the calculations for voltage gradient on the surface of the sub-conductor. **(01)**

G) Draw the audible noise frequency spectra from AC and DC transmission line. **(01)**

H) List the two types of corona discharge from transmission line conductors. **(01)**

I) Write the characteristics of bundled conductors. **(01)**

J) What is the need of compensation in the transmission lines? **(01)**

Q2. A) What are the Conductor configurations used for bundles in E.H.V. lines and also explain properties of Bundled conductors? **(05)**

B) Explain in detail capacitances and inductances of ground return and derive necessary expressions. **(05)**

Q3. A) Discuss the advantages and problems with EHV AC transmission. **(05)**

B) Calculate the capacitance matrix of a 3-phase 400 kV horizontal line with the following dimensions: Height above the ground=H=15 m, Phase separation S=11 m, conductor 2x 3.18 cm diameter, and B=45.72 cm. **(05)**

Q4. A) Explain the generation and measurement of audio noise due to corona in EHV lines. **(05)**

B) List out different corona loss formulae and explain each one. **(05)**

Q5. A) A sphere gap with the spheres having radii $R = 0.5$ m has a gap of 0.5 m between their surfaces.

i) Calculate the required charges and their locations to make the potentials 100 and 0. **(05)**

ii) Then calculate the voltage gradient on the surface of the high-voltage sphere.

iii) If the partial breakdown of air occurs at 30 kV/cm peak, calculate the disruptive voltage between the spheres.

B) Explain the behaviour of a travelling wave when it is reflected from the terminal inductance. **(05)**

P.T.O.

Q6. A) Obtain Procedure for the Excitation Function from CIGRE Formula. **(05)**

B) Explain clearly how over voltages are generated when interrupting (i) low inductive currents and (ii) low capacitive current. Draw a figure showing ferro-resonance condition in a network when two poles of a circuit breaker are open and one pole is closed. **(05)**

Q7. A) Explain various static VAr compensators for reactive power control in EHV systems. **(05)**

B) What is the reason for the existence of sub-synchronous resonance in the steady state and transient conditions in series-capacitor compensated lines? **(05)**

Q8. A) What is the purpose of synchronous condenser and how voltage profile increases using synchronous condenser also the design of the rating of the synchronous phase modifier (or condenser for short)? **(05)**

B) Explain in detail the problems associated with power systems due to over voltages at power frequency. **(05)**

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