Exam. Code: 1018
Sub. Code: 35257

2055

M.E. Electrical Engineering (Power Systems)

Second Semester

EE-8202 (PS): EHV AC Transmission

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

NOTE: ***Attempt any five questions. Missing data (if any) can be appropriately assumed.***

x-x-x

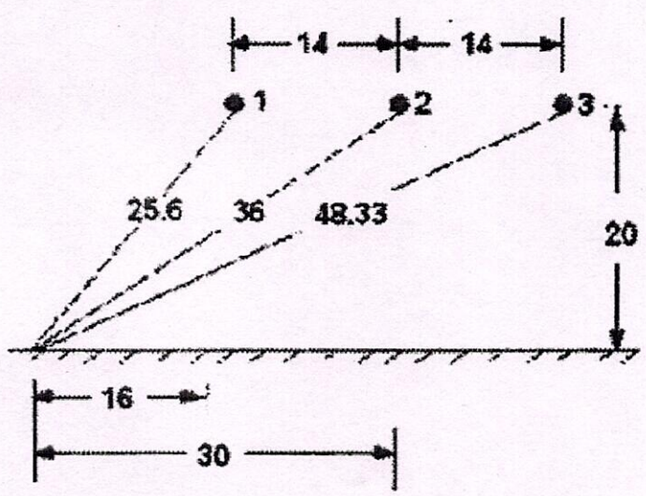
Q1 A) Explain the effect of resistance of conductor in EHV AC transmission system. **(5)**

B) A power of 1200 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kV, 750 kV, 1000 kV and 1200 kV, determine: **(5)**
i) Possible number of circuits required with equal magnitudes for sending and receiving end voltages with 30^0 phase difference.
ii) The current transmitted and
iii) Total line losses.

Q2 A) Define Geometric mean radius (GMR) of a bundle conductor. If N is the number of sub-conductors in the bundle, r is the radius of the sub-conductor and R is the bundle radius, show that **(5)**
$GMR = (N.\ r.\ R^{N-1})^{1/N}$

B) Explain the method of calculation of capacitance of multi-conductor transmission line. Show that the product of line capacitance and line inductance is inversely proportional to the square of the velocity of light. **(5)**

Q3 A 735 kV line has the following details: N = 4, d = 3.05 cm, B = bundle spacing = 45.72 cm, height H = 20 m, phase separation S = 14 m in horizontal configuration. By the Mangoldt formula, the maximum conductor surface voltage gradients are 20 kV/cm and 18.4 kV/cm for the centre and outer phases, respectively. Calculate the SPL or AN in dB (A) at a distance of 30 m along ground from the centre phase (line centre). Assume that the microphone is kept at ground level. **(10)**



735 kV line configuration

Q4 A) Develop the equations for electrical field, potential and potential difference in the vicinity of a line conductor. **(5)**

B) A sphere gap with the spheres having radii R = 0.5 m has a gap of 0.5 m between their surfaces. **(5)**
(i) Calculate the required charges and their locations to make the potentials 100 and 0.
(ii) Then calculate the voltage gradient on the surface of the high-voltage sphere.

Q5 A) State and explain different formulae used to calculate the power loss due to corona on E. H.V. lines. **(5)**

B) Derive general expression for the charge-potential relations for multi conductor lines: Maximum Charge Condition on a 3- Phase Line. **(5)**

P.T.O.

Q6 A) Describe the difference between a line spectrum and band spectrum for noise. What is the difference between a pure tone and broad-band spectrum? **(5)**

B) Define sub synchronous resonance. Show that the electrical resonant frequency of a compensated line is $f_e = f_o\sqrt{m}$: where f_o is power frequency and m is degree of compensation. **(5)**

Q7 A) How switching surges initiated in EHVAC lines? Explain any one method used for switching surge reduction in case of EHVAC lines. **(5)**

B) What are the different methods of reactive power compensation in EHV AC lines. **(5)**

Q8 A) Explain various measures adopted in e.h.v. systems to reduce overvoltage magnitudes. **(5)**

B) Explain line loadability. On what factors the line loadability depends upon. **(5)**

x-x-x