Code No: RT31023 **R13** SET - 1

III B.Tech I Semester Supplementary Examinations, October/November-2019

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A (22 Marks)

1 a) Find the geometric mean radius of bundled conductor having 4 sub-strands spaced with each strand is adjacent to each other. [3M]

b) What is the maximum value of voltage regulation in short transmission line? [4M]

c) If Y is the impedance of the transmission line, obtain its modified value to represent in the equivalent – T model by the long line approximation. [3M]

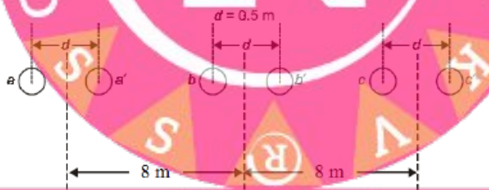
d) How the switching transients are severe in the power system? [4M]

e) What is the necessity of series compensation in transmission line? [4M]

f) What is the importance of static shielding provided on transmission? [4M]

PART –B (48 Marks)

2 a) A bundled conductor has two sub-conductors which are configured for a three phase line as shown in the below figure. Compute inductive reactance per phase of this line at 50 Hz. Assume that radius of each sub-conductor is 30 mm and line is fully transposed. [8M]



b) Derive the expression for capacitance of three phase double circuit transposed line. [8M]

3 a) How do you determine A, B, C, D parameters of parallel and cascaded connected two transmission lines? Explain. [8M]

b) A three phase 220 kV, 300 km long transmission line is having 25 MVA load at 0.8 p.f. The series impedance and shunt admittance per phase per km are $z = (0.045 + j\,0.04)\,\Omega$ and $y = j4 \times 10^{-6}$ ℧. (i) evaluate nominal π – model by finding all sending end quantities (ii) Voltage regulation under at no load. [8M]

4 a) Describe the interpretation of long line equation in terms of incident and reflected waves. [8M]

b) A long transmission line delivers a load of 60 MVA at 132 kV, 50 Hz at 0.8 p.f lagging. Resistance of the line is 25.3 Ω, reactance is 66.5 Ω and its admittance due to line charging is $0.445 \times 10^{-3} mho$. (i) Find sending end voltage by rigorous solution (ii) regulation at no load and full load. [8M]
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5 a) How do you find reflection and refraction coefficients are found at a T-junction? [6M]

b) Derive the expression for transmitted and reflected voltages at the capacitive junction due to transients? Draw the voltage and current waves if the line is terminated with a capacitance. [10M]

6 a) How do you determine power loss due to corona and explain the factors affecting corona loss? [8M]

b) In three phase overhead line the conductor have each diameter of 30 mm and arranged in the form of an equilateral triangle. Assuming fair weather conditions air density factor is 0.96 and irregularity factor 0.96. Find the minimum spacing between the conductors if the disruptive critical voltage is not to exceed 220 kV between the lines. Breakdown strength of air may be assumed to be 30 kV per cm (peak). [8M]

7 a) Deduce the expression for determining the sag of overhead line for level and different level supports. [8M]

b) The self-capacitance of each unit in a string of three suspension insulation is C. The shunting capacitance of the connecting metal work of each insulator to earth is 0.15C while for line it is 0.1C. Calculate (i) The voltage across each insulator as a percentage of the line voltage to earth and (ii) string efficiency. [8M]

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